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BIOLOGIA
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1961

Male Reproductive Tract of the Northern Palm Squirrel (Funambulus pennanti Wroughton)

Part I. The Cowper's Gland

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Gross morphology and histology of the Cowper's gland in *Funambulus pennanti* has been described. The gland is of the compound tubulo-alveolar type. The greater part of the gland is embedded in the tissue of the bulb while the posterior portion extends into the corpus cavernosum urethrae for some distance. The alveoli in all regions of the gland are more or less of the same size and equally active in their secreting activity. Cowper's gland in this species has been compared with that of some other species of Sciuridae.

INTRODUCTION

The present paper attempts to describe the structure of Cowper's gland of the northern palm squirrel. It is intended to be the first of a series which will deal with the morphology of the male reproductive tract in this animal. The study of sciurid Cowper's gland is of particular interest because of the considerable variation found in its structure and the extent of its development in the various species (Parkes, 1956). In the following discussion the gross morphology and histology of the gland has been treated with some detail and comparisons have been made with the Cowper's glands of some other sciurids in which the male reproductive tract has already been worked out. (Mossman, Lawlah and Bradley, 1932 ; Prasad, 1954 ; Siddiqi, 1938).

MATERIAL AND METHOD

These observations are based on a study of eight mature squirrels caught from a garden adjoining the Zoological Laboratory of the Government College, Lahore, during the months of May and June when their accessory reproductive glands are fully developed. The entire reproductive tract of the animal was dissected and fixed in Bouin's fluid. After partial removal of the fixative the material was stored in 70 per cent alcohol or in a mixture of equal parts of 70 per cent alcohol and glycerine, It was found that the material preserved in alcohol-glycerine mixture was easier to section. Serial paraffin sections of the entire bulb and the proximal part of the penis were cut 10 microns thick. The sections were stained with acid Haemalum and eosin. Mallory's Connective Tissue stain was used to distinguish the muscular from the connective tissue.

OBSERVATIONS

The Cowper's gland is a profusely branched structure. It consists of numerous closely packed alveoli and communicates with the urethra by a single opening. Morphologically the gland lies dorso-medially to the proximal part of the penile urethra (fig. 1). Since in life the penis is bent forwards, the Cowper's gland comes to lie on the ventral side of the urethra. The greater part of the gland (fig. 1, G) is embedded in the tissue of the bulb (fig. 1, B) while the posterior portion extends into the corpus cavernosum urethrae (fig. 1, S) fora little distance. The gland, therefore, cannot be discerned from outside.

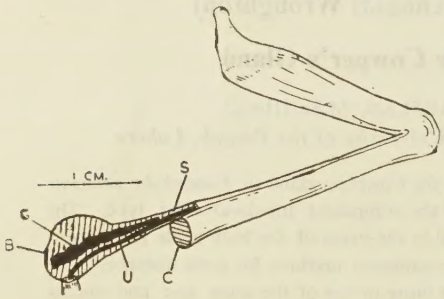

Fig. 1.—Diagrammatic longitudinal section of the penis. B, bulb of the penis; C, corpus cavernosum penis; G, Cowper's gland; S, corpus cavernosum urethrae; U, urethra.

The Cowper's gland in *Funambulus pennanti* can be roughly classified as of the compound tubulo-alveolar type. Regarding the arrangement of the alveoli it can be divided into three regions, the terminal, the middle and the basal.

TERMINAL PORTION. The terminal portion lies in the tissue of the bulb and is covered by the bulbo - urethral muscles. It consists of numerous groups of alveoli separated by strands of connective tissue. The alveoli belonging to one group are closely packed together and the epithelia of the adjacent alveoli are separated by an extremely thin layer of connective tissue (fig. 2).

The epithelium of the alveoli consisting of columnar cells is about 30 microns

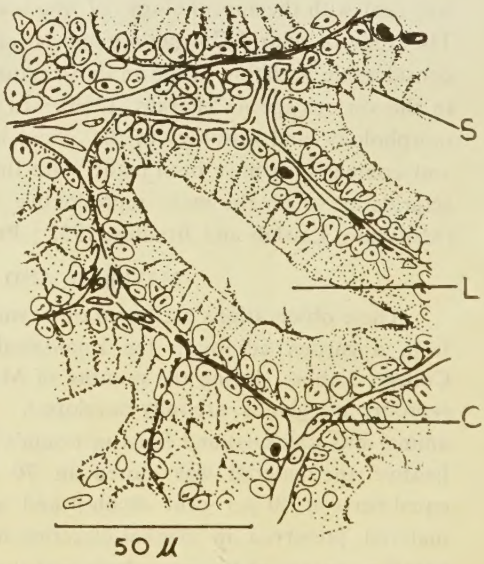

Fig. 2.—Section passing through a group of alveoli of the terminal portion of Cowper's gland. C, layer of connective tissue; L, lumen of the alveolus; S, strand of mucus.

high. The nuclei of these columnar cells are situated at the base. They are spherical to oval in shape and contain one or two nucleoli. The cytoplasm in fixed and stained condition appears reticular or granular. The cytoplasm is lightly stained with basic dyes but takes up quite an intense colour when counterstained with eosin. Coming out from the epithelium of the alveolus and projecting into the lumen can be seen strands of mucous substance (fig. 2, S).

The alveoli of a group open into a common tubule. These tubules may unite with each other at different levels. The epithelium of these tubules shows a pseudostratified condition and the nuclei of the cells are closely packed (fig. 3). The connective tissue of the bulb surrounding this portion of the gland is loose and is provided with many venous spaces.

MIDDLE PORTION. In the middle portion, the tubules coming from the anterior region meet and form into two major tubules, surrounded all along with groups of alveoli which communicate with the major tubules either directly or through tubules with pseudostratified epithelia. The nature of the epithelium of the major tubules is identical with that of the smaller tubules which drain the alveoli.

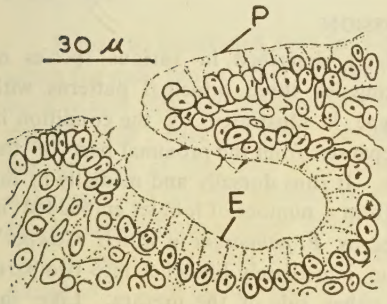

Fig. 3.—An alveolus opening into a tubule. E, simple columnar epithelium of the alveolus; P, pseudostratified epithelium of the tubule.

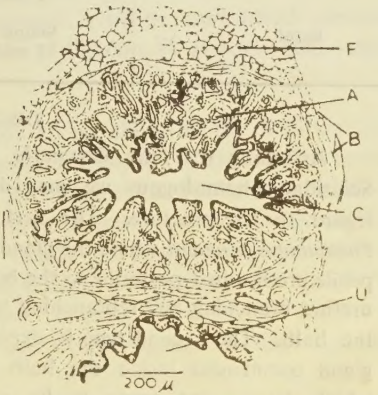

Fig. 4.—Section passing through the basal portion of the Cowper's gland. A, alveolus; B, blood sinuses of the cavernous tissue; C, median channel of the Cowper's gland; F, adipose tissue; U, urethra.

The middle portion of the Cowper's gland is more or less completely invested by the cavernous tissue of the bulb, which is better developed on the lateral sides of the gland. Posteriorly the tissue of the bulb acquires charac-

ters of adipose tissue especially on the dorsal aspect of the Cowper's gland. Cephalo-caudally the middle portion measures about 2.5 mm.

Basal Portion. In the basal portion (fig. 4) the two major tubules unite with each other to form a common channel (fig. 4, C), about 4.5 mm. long. The posterior 2.5 mm. long part lies outside the bulb, traversing the corpus spongiosum of the shaft of the penis. The nature of the alveoli (fig. 4, A) opening into the median channel is similar to that of the terminal and middle portions. Distally the partition between the median channel of the gland and the underlying urethra, breaks down and their cavities become confluent

Table 1. *Showing the nature and height of the epithelium in various regions of the Cowper's gland.*

Portion of the Cowper's gland	Epithelium lining the alveoli	Epithelium lining the tubules
Terminal ...	Simple columnar 13 microns high	Pseudostratified 20 microns high
Middle ...	Simple columnar 12 microns high	Pseudostratified 15 microns high
Basal ...	Simple columnar 12 microns high	Pseudostratified 13 microns high

DISCUSSION

Assuming that the Cowper's gland described in various species of Sciuridae is homologous we may distinguish three principal patterns with regard to its structure. The first type is illustrated by the condition in *Funambulus pennanti* where the gland separates from the proximal part of the penile urethra just posterior to the bulb. It runs dorsally and medially to the urethra branching and rebranching to form a number of lobules embedded in the bulb. The second type is depicted by *F. palmarum* in which Cowper's gland commences inside the bulb and inmediately branches into two parts which diverge and come to lie on either side of the urethra. Like the previous type the gland in this species does not emanate out of the tissue of the bulb (Prasad, 1954). The third type is shown by *Citellus tridecemlineatus* in which the gland separates from the distal portion of the penile urethra, expanding in the region of the bulb and dividing into three parts, two lateral and one median. The median part does not extend beyond the tissue of the bulb while the two lateral branches grow beyond the bulb to form coiled structures (Mossman et al., 1932). The expansion of the Cowper's gland in

the blub in *C. tridecemlineatus* has been assigned the status of a distinct gland, the bulbar gland, by Mossman et al. (1932). According to these authors, it is the large coiled structures lying outside the bulb that represent the Cowper's gland proper (= Bulbo-urethral glands). The distnction between the e two types of glands is mainly based by Mossman et al. (1932), on the nature of the folding of epithelium, and the presence or absence of striated muscle fibres in their sheaths etc. In my opinion, one need not go in all these de ails. A single gland as large in its dimensions as the Cowper's gland of *Citellus tridecemlineatus* that extends from the ventrai flexure of the penis and goes beyond the region of the bulb can well show regional differentiation. Siddiqi (1938) describing the gross morphology of the reproductive tract in *Funambulus palmarum* mentions the presence of the bulbo-urethral glands and the median 'bulbar' gland. Prasad (1954) on the other hand does not describe the bulbar gland or a corresponding structure in this species.

Another distinction between the bulbar gland and bulbo-urethral glands made by Mossman et al. (1932), is that the latter drain by a pair of ducts while the former drains by a single duct which they designate as the penile duct. It is highly probable that the penile duct in *Citellus tridecemlineatus* corresponds to the posterior part of the Cowper's gland as seen in *Funambulus pennanti*. This part in *F. pennanti*, it will be remembered, consists of a single channel surrounded like the penile duct by alveoli. (Mossman et al., 1932).

It may be mentioned that in almost all members of the Sciuridae in which the male genital tract has been studied, Cowper's gland always opens by a single channel into the urethra (Mossman et al., 1932 ; Prasad, 1954 ; Siddiqi, 1938 ; Parkes, 1956). As has been pointed out by Clark (1958), the opening of the duct of a gland marks the position of the embryonic outgrowth and that the presence of a single duct would suggest that the gland has developed from a single diverticulum. It may, therefore, be suggested that in many members of Sciuridae the Cowper's gland is single and not paired as in most mammalian species.

Siddiqi (1938) has described a penile duct in *Funambulus palmarum* running in the proximal two-thirds of the penis. No such structure has been reported by Prasad (1954) in *F. palmarum palmarum*. As Prasad (1954) has pointed out Siddiqi (1938) most probably described the genital tract of *F. pennanti*. In *F. pennanti*, however, a very careful reconstruction from serial sections and microdissections shows that the part of the Cowper's gland lying outside the bulb is not longer than 2.2 mm.

It has been pointed out earlier that the greater portion of the Cowper's gland in *F. pennanti* is surrounded by a typical cavernous tissue. It is highly probable that at the time of ejaculation this cavernous tissue exerts a pressure on the alveoli, by accumula ing blood, so that their secretions are pressed down through the tubules into the urethra. When Cowper's glands lie outside the bulb as in man the connective tissue septa between she glandular alveoli contain muscle fibres (Maximow and Bloom, 1957). No such muscle fibres can be seen in *F. pennanti.* Perhaps their function has been taken over pastly by the cavernous tissue in which the alveoli are invested and partly by the bulbo-urethral muscles which envelop the bulb.

SUMMARY

1. Gross morphology and histology of the Cowper's gland in *Funambulus pennanti* has been described.

2. Cowper's gland in this species has been compared with that of some other species of Sciuridae.

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Revision of the genus Astragalus L. from W. Pakistan and N. W. Himalayas

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Astragalus (from the Greek name of a shrub supposed to belong to or related to this genus) is the biggest Angiospermous genus (Eig, 1955), comprising about 1,600 species (de Wolf, 1957). It is widely distributed in Old and the New Worlds, the centre of distribution being Central Asia. The habit of the members varies considerably, from annual herbs to perennial shrubs.

From economic point of view the genus is of little importance. A few species (*A. hamosus*, *A. multiceps* and *A. tribuloides* etc.) are used medicinally. Some species yield 'gum tragacanth' which is used by printers and dyers. *A. multiceps* is browsed by cattle and the calyces are eaten by local people in the Salt Range (Watt, 1883). Other species, for example, *A. mollissimus*, *A. lentiginosus* and *A. canadensis* contain certain toxic substances and have been known to poison horses and sheep, fatally in the case of the last species (Jones, 1923).

Bunge (1868, 1869) produced the classical monograph of the genus *Astragalus*. Boissier (1872) in *Flora Orientalis* Vol. 2 has revised the genus from Orient. Recently Peter-Stibel (1938) revised the genus from China, Gontscharov et al. (1946) from Russia, Eig (1955) from the near East and Rechinger f. (1957) from Afghanistan. In the area under consideration, after the classical works of Baker (1876) and Boissier (1872), almost no work has been done on the genus for the last eighty years except that of Parker (1921) who revised the species of the section *Aegacantha*. Recently the present author has contributed a few papers (Ali, 1958a, 1958b, 1961) to elucidate the taxonomic position of a number of species occurring in the area under consideration.

In the present paper an attempt has been made to revise this prolific genus from W. Pakistan and N. W. Himalayas. In all 106 species have been recognised thus showing an increase of ca. 35 species as compared to the number of species recognised by Boissier (1872) and Baker (1876).

The area under consideration consists of W. Pakistan, E. Punjab (India) and Kumaun (India). The following subdivisions of the area have been recognised: Sind, Baluchistan, N. W. F. Province, Punjab (East & West), Kashmir and Kumaun (including Garhawal).

The information about the flowering period of the taxa given in each case is referable to the plants from the area under consideration and may not be referable elsewhere.

Classification of the genus

Bunge (1868) divided the genus into 8 subgenera. Boissier (1872) has maintained all the subgenera of Bunge as subseries, except *Pogonophace* Bunge. Further, he has introduced a new subseries *Epiglottis* Boiss. The various sections of *Pogonophace* Bunge, which occur in Orient have been distributed by Boissier under *Cercidothrix*, *Phaca* and *Trimeniaeus*. Baker (1876) has recognised 10 subgenera. He has introduced 2 new subgenera, namely *Trichostylus* Baker and *Podolotus* (Royle ex Benth.) Baker, and has raised 2 sections, *Myobroma* Bunge and *Aegacantha* Bunge to the subgeneric status.

It is definitely impossible to evaluate any of these classifications after studying only a fraction of the total number of species recognised in the genus. Nevertheless, it is desirable to utilise subgeneric limits to facilitate a workable key for identification. Hence convenience rather than natural relationships has been the main principle followed in accepting the various subgenera of previous workers.

In an earlier paper (Ali, 1958a) the present author has briefly discussed the reasons for not accepting the subgenera *Trichostylus* Baker and *Trimeniaeus* Bunge. The representatives of *Trichostylus* as discussed elsewhere (Ali, 1958) have been put under *Pogonophace* and the taxa hitherto put under *Trimeniaeus* have been accommodated under the subgenus *Astragalus*. The subgenus *Pogonophace* Bunge has been recognised here though section *Caraganella* which Bunge (1868, 1869) put under *Pogonophace* has been accepted under *Cercidothrix* following Boissier (1872).

The subgenera *Phaca* and *Hypoglottis* which were differentiated by Bunge (1868) according to the characters of inflorescence have been merged together, because the intermediate forms between the two are commonly met with. Both these subgenera have been united under subgenus *Astragalus* (=*Phaca*). The same treatment was accorded to *Hypoglottis* earlier by Peter-Stibel (1938).

The species belonging to different subgenera have been keyed separately for convenience. The sections have been indicated in the text.

Astragalus L. Sp. Pl. 755.1753; Gen. Pl. 335.1754.

Type Species: *Astragalus christianus* L. (Hitchcock & Green, 1929).

Artificial Key to the subgenera:

1. Hairs basifixed ... 2
   Hairs mediofixed ... 7

2. Stigma penicillate ... (1) *Pogonophace.*
   Stigma not penicillate ... 3
3. Calyx turbinate, acute at the base, flower sessile (2) *Tragacantha.*
   Calyx not turbinate, obtuse to gibbous at the base, flowers sessile or pedicellate ... 4
4. Corolla persistent, fruiting calyx becomes inflated (3) *Calycophysa.*
   Corolla not persistent, fruiting calyx does not become inflated ... 5
5. The endocarp of the unilocular fruit separating as a thin membrane and coming out enclosing the seeds ... (4) *Podolotus.*
   The endocarp of the fruit not separating as a thin membrane enclosing the seeds ... 6
6. Calyx campanulate, stipules free from petiole, attached to the stem ... (5) *Astragalus.*
   Calyx tubulose, stipules attached to the petiole ... (6) *Caprinus.*
7. Calyx inflated in pods ... (7) *Calycocystis.*
   Calyx not inflated in pods ... (8) *Cercidothrix.*

Subgenus **Pogonophace**

Artificial Key to the Species:

1. Legume unilocular ... 2
   Legume partly or completely bilocular ... 7
2. Wing shorter than the keel ... 3
   Wing equal to or longer than the keel ... 5
3. Inflorescence 1—3 flowered ... (1) *A. pycnorhizus.*
   Inflorescence more than three flowered ... 4
4. Calyx±.5—.6 cm. or less long, petiole ±.5 cm. or less long ... (2) *A. tribulifolius.*
   Calyx ±.7—1.0 cm. or more, petiole more than 1 cm. (up to 5 cm) long ... (3) *A. kongrensis.*
5. Claw of the keel more than half the blade (claw ±.4—.5 cm., blade ±.5—.6 cm) ... (4) *A. hendersonii.*
   Claw of the keel less than half the blade ... 6
6. Aerial stem elongated, inflorescence 1—2 flowered ... (1) *A. pycnorhizus.*
   Aerial stem almost absent, inflorescence more than 2 flowered (4—6 flowered) ... (5) *A. heydei.*
7. Legume stipitate ... 10
   Legume sessile ... 8

8.	Legume rostrate, valve only slightly pushed inward seeds 10—12 ...	(6) *A. amherstianus.*
	Legume not rostrate, partially bilocular seeds more than 20 ...	9
9.	Legume with only one type of hairs (appressed)	(7) *A. eremophilus.*
	Legume with two types of hairs (appressed and erect) ...	(8) *A. bakaliensis.*
10.	Stipe of the legume longer than the calyx ...	11
	Stipe of the legume shorter than the calyx ...	15
11.	Stipules foliaceous, persistent ...	13
	Stipules not foliaceous, deciduous ...	12
12.	Leaflets pilose on both the sides ...	(9a) *A. coluteocarpus* var. *coluteocarpus.*
	Leaflets glabrous on the adaxial side ...	(9b) *A. coluteocarpus.* var. *glaber.*
13.	Fruit septum <.1 cm. broad, leaflets 21—41 ...	14
	Fruit septum >.1 cm. leaflets 13—17, occasionally up to 23 ...	(10) *A. falconeri.*
14.	Fruits glabrous ...	(11a) *A. hoffmeisteri* var. *hoffmeisteri.*
	Fruits pilose, at least when young ...	(11b) *A. hoffmeisteri* var. *pilosus.*
15.	Fruit 14—24 seeded ...	(12) *A. scorpiurus.*
16.	Fruit 6—8 seeded ...	(13) *A. subumbellatus.*

1. **Astragalus (Thyllolobium) pycnorhizus** *Wall.* ex Benth. in Royle, illustr. Bot. Himal. Mount. : 199.1935.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 119.1876.

Holotype: Emodus, Gosainthan, Wall. 5927 (K-W).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Kumaun : Chalek, Kali valley, 11—12,000′, Duthie 5482(K); (BM); (G).

Distribution: India, Kumaun; *Sikkim*; *Bhutan*; *Nepal*; *Tibet.*

Flowering Period: May-August.

This is the first record of this species from Kumaun.

2. **Astragalus (Thyllolobium) tribulifolius** *Benth.* ex Bunge, Astrag. 1: 4.1868: 2: 2.1869.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 120.1876.

As Bunge (1869), Baker (1876) and Blatter (1927) have not given the

description of the mature fruit. It has been drawn afresh and should be supplemented in the description referred above.

Fruit stipitate, stipe ±.2 cm. long; fruit (excluding the stipe) ±.9—1.4 cm. long, ±.5—.6 cm. broad, elliptical with acute ends; pilose, hairs white or white and black; unilocular, later becoming pseudobilocular by the intrusion from the upper suture; many seeded, mature seeds not seen.

Holotype: W. Tibet, 16,000′, Thomson (K).

Synonymy:

Astragalus tanguticus *Batalin* in Acta Horti petropol. 11 (2): 485.1891.

In Kew Herbarium, the pencil drawing of the holotype and the dissection of the flower from the same source was observed. There can be no doubt that *A. tanguticus* Batalin (1891) is conspecific with *A. tribulifolius* Benth. ex Bunge (1868).

Figure Reference: Nil.

Representative Specimens:

Kashmir: Rupshu, Heyde (K); Rupshu, valley below Haule, 14,500′, 18-9-1847, Thomson (K); Rupshu, between Da and Haule, in sand, along stream, 15,000′, W. Koelz 2288(K).

Distribution: Kashmir, Rupshu; *Tibet*; *Sikkim*; *China,* Kansu, Szechuan. (Peter-Stibel, 1938).

Flowering period: July-September.

3. **Astragalus (Phyllolobium) kongrensis** *Benth.* ex Baker in Hook. f. Fl. Brit. Ind. 2: 120.1876.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 120.1876.

Holotype: Kongra Lama, 15,000′, July 24, 1849. Hooker f. (K).

Synonymy: Nil.

Figure reference: Nil.

Representative specimens:

Kumaun: Matoli, north Kumaun, 13,000′, Champion (K).

Distribution: India, Kumaun; *Tibet*; *Sikkim*; *Bhutan,* 13,000′—19,000′.

Flowering Period: July.

This is the first record of this species from Kumaun.

4. **Astragalus (Phyllolobium) hendersonii** *Baker* in Hook. f. Fl. Brit. Ind. 2: 120.1876.

Description: Baker in Hooker f. Fl. Brit. Ind. 2: 120.1876.

Holotype: Upper Karakash valley, 1870, Henderson (K).

Synonymy: Nil.

Figure reference: Nil.

Representative Specimens:

Tibet: 16,800′, W. G. Thorold 50 (K); Tibet (35′18-87′0) 16,401, Wellby and Malcolm (K).

E. Turkistan: Karakash watershed, 1870, Cayley (K).

Distribution: Tibet; E. Turkistan.

Flowering Period: July-September.

Though this species does not occur in the area under consideration, it has been included here because it was previously confused with *A. heydei* Baker by Hemsley (1902) who regarded the two to be conspecific. The present study has shown that the two species are quite distinct and may be identified easily according to the characters of the keel (see the identification key).

5. **Astragalus (Phyllolobium) heydei** *Baker* in Hook. f. Fl. Brit. Ind. 2: 118.1876.

Description: Baker in Hook. Fl. Brit. Ind. 2: 118.1876.

Lectotype: By the Tso-kar sea, between Rupshu and Korsog, Heyde (K).

Synonymy: Nil.

Figure reference: Nil.

Representative Specimens:

Kashmir: Rupshu, 15—18,000′, Stoliczka (K); Tibet occ., 15—16,000′, Strachey 19/1 (K); Rupshu, Kyensa La, 18,000′, W. Koelz 2229(K); (E).

Distribution: Kashmir, Rupshu; *W. Tibet*; Alpine region, above 15,000′.

Flowering Period: June.

6. **Astragalus (Falcinellus) amherstianus** *Royle* ex Benth. in Royle, Illustr. Bot. Himal. Mount. 199.1935.

Description: Baker in Hook f. Fl. Brit. Ind. 2: 119.1876.

Holotype: Simla, Sarah Amherst (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Punjab: Chenab valley, 8,000′, 1852, Thomson (K); Chenab valley. Reroli, 9,000′, R. Ellis 179 (K); Murree hills, Banni, Parker. 3421 (K); Murree, Drummond, 24773 (K); Kunawar, 8,000′, 1852, Thomson (K); Gondla, Kyelang. 10,300′, Bor 14661 (K); (E).

N.W.F. Province: Lendi, Naran Kagan, 21-6-1899, Duthie (K); Hazara. Malkandi, Duthie 19342 (K).

Baluchistan: Ziarat, 8,500′, S. A. Harriss 16023 (K).

Kashmir: Ramoo, 6,000′, Clarke 28502A (K); 28502B (BM); Kishtwar, 8—9,000′, 14-6-1848 Thomson (K).

Kumaun and Garhwal: Badrinath, 10—11,000′, 1844, Edgeworth 75 (K); Sandy bed of river Gangotri, Tehri Garhwal, 12—13,000, Duthie 1494 (K).

Him. bor occ., 6—7,000, Thomson (BM); (G).

Distribution: W. Pakistan, Punjab, N.W.F. Province, Baluchistan; *Kashmir*; *India*, Kumaun, Tehri Garhwal, N. Punjab 6,000′—13,000′.

Flowering Period: April-June.

7. **Astragalus (Falcinellus) eremophilus** *Boiss.* Diagn. Pl. Or. Nov. Ser. 1 (2): 54.1843.

Description: Boissier, Fl. Orient. 2: 230.1872.

Holotype: In desert, Arabia, Schimper 777 (G); Type number (K).

Synonymy: Nil.

Figure reference: Nil.

Representative Specimens:

Baluchistan: Kahir kah, coast of Baluchistan, E. Pierce (K); Baluchistan, Stocks 716A (K).

Distribution: Egypt; *Arabia*; *Persia*, Bendar Abbas, Shiraz (Parsa, 1948); *W. Pakistan*, Baluchistan.

Flowering Period: June.

8. **Astragalus (Falcinellus) bakaliensis** *Bunge* in Arb. Naturf. Vir. Riga 1: 249.1847: t. 14, f. 2. 1848.

Description: Boiss. Fl. Orient. 2: 231.1872.

Holotype: 'Bei Bakali, 28 April, 1842, Lehman 378 (LE-not seen).

Synonymy: Nil.

Figure Reference: Bunge in Arb. Naturf. Vir. Riga 1: t. 14. f. 2. 1848.

Representative Specimens:

Baluchistan: Peshin, 5,200′, Lace 3476 (K); Kila Abdulla, 5,100′, April, 1889, Lace (E); Shebo, Lace 3576 (E).

Distribution: W. Pakistan, Baluchistan; *Afghanistan* (Bunge, 1869; Boissier, 1872); *Persia*, Isfahan, Kerman, Bunder Abbas (Parsa, 1948); *U.S.S.R.* Kyzyl Kum (Bunge, 1869; Boissier, 1872).

Flowering Period: March.

9. **Astragalus (Coluteocarpus) coluteocarpus** *Boiss.* Diagn. Pl. Orient. Nov. 1 (9); 65.1849; Ali, Kew Bull. 1958 (2); 303.1958.

(*a*) *var. coluteocarpus.*

Description: Boissier, Fl. Or. 2: 271.1872.

Holotype: 'In regiono Cabulico', Griffith 1064 (K).

Synonymy: Nil.

Figure reference: Nil.

Representative Specimens:

Punjab: Upper Kunawar, 9,000′, 22-8-1847. Thomson (K); Upper Kunawar, 10,000′, 1852, Thomson (K).

Kashmir: Dras, 11,000′, R. R. Stewart 7473(K); Rattu above Astor, 9,000′, R. R. and I. D. Stewart 18821(K).

N.W.F. Province: Kurram valley, Karchetal ravine, 9,000′, Aitchison 586(K); (B.M); (G).

Distribution: W. Pakistan, N.W.F. Province; *Afghanistan*; *India*; N. Punjab.
Flowering Period: June.

(*b*) var. **glaber** *Ali* in New Bull. 1958 (2): 304.1958.

Differs from var. *coluteocarpus* in having leaflets glabrous adaxially; on the abaxial side the leaflets are uniformly or sparsely pilose.

Holotype: Chitral, below Zapotili, 3,500′m. 23.6.1950. P. Wendelbo (K).
Synonymy: Nil.
Figure Reference: Nil.
Representative Specimens:

Punjab: Mani, Spiti, 11,500′, H. A. C. Gill 2054(K); Chenab valley, 8,000′, 1852, Thomson (K).

Kashmir: Dras, 10,000′, 25.9.1848, Thomson (K).

Yarkand Expedition: 1870, Henderson (K).

Distribution: Kashmir: W. Pakistan, Chitral; *Russia,* Pamir, Alai vide description (Gontscharov, 1946); *Turkestan.*

Flowering Period: June.

10. **Astragalus (Sesbanella) falconeri** Bunge, Astrag. 1: 4. 1868; 2: 2.1869.
Description: Baker in Hook. f. Fl. Brit. Ind. 2: 120.1876.
Holotype: West Tibet, Falconer (K).
Synonymy:

1. *Astragalus acutifolius* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2: 120.1876. pro. syn.

Figure reference: Nil.
Representative Specimens:

Kashmir: Karakorum, Ashkoley, 10,500′, Clarke 30381A(K); 30381C(K); 30381D(BM); Karakorum, 11,000′, Clarke 30114A(K); 30114B(BM). Rupal Nullah, near Tarshing, Astor Dist. 8,500′, R. R. Stewart 20839(K); Godai, Astor Dist. 9,000′ R. R. Stewart 18945(K); Godhai valley, 11—12,000′, Astor, 22.7.1892. Duthie (K). Suru valley, 11,500′, Osmaston 180(K); Gorikot to Das Kirim, Astor, 8—9,000′, R. R. Stewart 22961(K); Hassora, Astor, 1852, Winterbottom (K); Ihopu, 9,000′, Gilgit Exped., Giles 424(K); Harchin, 9,000′, Toppin 653(K); Rupal nallah, Astor, 9,000′, R. R. Stewart 22839(K); (RAW); Rattu, Kamri nallah, Astor, Inayat 25588(K); Godeh, Hupora, Winterbottom 749(K); Baltistan, Shagarthang valley, 10—11,000′, Duthie 12113 (BM); (E); (G). N. of Hindukush, Giles (E); Baltistan, Shyok, 8,500′, Inayat 10200(G)0; Purig, Parkachen, W. Koelz 6029(G); 'Holshal pres Nagar,' 3100-3250m. 20.6.1954, F. Schmid. 1959 (G).

Distribution: Endemic to Kashmir, 8,000′—11,000′. 'Tibet occ.' borno on Falconer's specimen (Holotype) refers to Kashmir. This specimen was collected in 1838 when he was in Kashmir (Burkill, 1956).

Flowering Period: July-September.

11. **Astragalus (Sesbanella) hoffmeisteri** (*Klotzsch*) *Ali*, in Kew. Bull. 1958(2): 304.1958.

(*a*) var. *hoffmeisteri*

Description: The description of *Astragalus adesmiaefolius* Benth. ex Bunge as given Baker in Hook. f. Fl. Brit. Ind. 2: 121.1876. This description should be supplemented as follows: (*i*) Young branches and rachis minutely hairy. (*ii*) Leaflets sometimes minutely hairy along the midrib on the abaxial side.

Holotype: Himalaya, Hoffmeister (B-not seen) My observations are based on the figure (Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: t. 2.1862) published with the original description.

Synonymy:

1. *Phaca hoffmeisteri* Klotzsch in Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: 159.1862.

2. *Astragalus adesmiaefolius* Benth. ex Bunge, Astrag. 1: 4. 1868; 2: 2.1869.

Figure Reference: Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: t. 2. 1862.

Representative Specimens:

Punjab: Piti, 1851, Thomson (K); Piti, 11,000′, 25.8.1847. Thomson (K); Kunawar, Munro 641(K); Bashahr state, Changa La, 15,000′, W. Koelz 7247 (G).

Kashmir: Zanskar, 12,000′, 1852, Thomson (K). Indus valley, W. of Leh. 11,000′, Nubra, 11,000′, 1852, Thomson (K); Tibet occ. 8—12,000′, Thomson (K); (BM); (E). Dras, Kargil, 8,000′, 23.9.1848, Thomson (K); Ladakh 11,000′, 9.7.1848, Thomson (K); Zanskar, 12,000′, 2.6.1848. Thomson (K); Ashkoley, 10,050′, Karakorum, Clarke 30410(K); 30410B(BM); Baltistan, Hunter-Weston 10201B(K). At highest point reached on Hunnuno above Hoper camp, 12,000′, Expedition to Karakoram glaciers, W. M. Conway 102(K); Karakorum, 10,200′, Clarke 30477A(K); Shingo valley, 10—11,000′. Baltistan, 8.7.1892, Duthie (BM); Umlung, Karakorum trade route, 12,500′. Ladakh, Ludlow 548 (BM), Zaskar, Bardun, 12.000′, W. Koelz 5748 (G); Purig, W. Koelz 6038 (G); Zaskar, Tetha, 13,000′. W. Koelz 5637(G). West Tibet, Falconer 418(K). N. W. India, J. L. Stewart (E).

Distribution: Kashmir: India, N. Punjab; 8,000′—13,000′.

Flowering Period: June-August.

(*b*) var. **pilosus** *Ali* in Kew Bull. 1958 (2): 304.1958.

This variety differs from var. *hoffmeisteri* in having fruits minutely pilose at least when young. The young branches are also more densely hairy.
Holotype: Karakorum, 10,500′, 6.8.1876, Clarke 30111A(K).
Representative Specimens:

Kashmir: Baltistan, 1890, Hunter-Weston 10,201A (K); Hushenallah, 9,500′, Baltistan, Ludlow 361 (BM); Khosomik, Thalle pass to Shyok, Baltistan, 9,000′, R. R. Stewart 20784(RAW).
Distribution: Kashmir.
Flowering Period: June-August.

12. **Astragalus (Falcinellus) scorpiurus** *Bunge*, Astrag. 1: 5.1868; 2: 3.1869; Ali in Kew Bull. 1958 (2): 305.1958.

Description: The description of *A. subumbellatus* as given by Kashyab, Lahore Dist. Fl. 78.1936.
Lectotype: Caschmire, Jacquemont 14(P). Syntype: Kashmir, Jacquemont 110(P). Type numbers (K).
Synonymy:

1. *Astragalus punjabicus* Sirj. in Brittonia 7 (4): 275.1951.
2. *A. lasius* Blatter in J. Bomb. Nat. Hist. Soc. 36: 480.1933.
3. *A. humifusus* Jacq. ex. Baker in Hook. f. Fl. Brit. Ind. 2: 119.1876. pro syn., non Willd. (1803).

The type of *A. lasius* Blatter expected to be at Blatter's Herbarium, Bombay is not traceable there. However a study of the description of the taxon has lead me to believe that it is conspecific with *A. scorpiurus* Bunge.
Figure Reference: Nil.
Representative Specimens:

N.W.F. Province: Peshawar, J. L. Stewart (K); Dera Ismail Khan, 700′, H. A. Deane 24(K).

Punjab: Gujrat, Drummond 17783(K); Salt range, Aitchison 159(K); Rawalpindi, Aitchison 376(K); Punjab, J. L. Stewart 100/pp (K); Attock, R. R. Stewart 7012(K); 23604(K); Rawalpindi, 1,700′, R.R. Stewart 15309 (K); Topi Park, Rawalpindi, 1,700′, R. R. Stewart 23605(K); Kohat, Drummond 40(K); Saida, Gujrat, Drummond 13783 (K); Pahl, Dt. Shahpur, Kabir ex Herb. Drummond 14864 (K); (E); (G); 14865 (K); (E); Rotas, Dt. Jhelam, Kabir ex Herb. Drummond 14861 (K); Narsingpur, Kabir ex Herb. Drummond 14862 (K); Jaba Dt. Shahpur, Kabir ex Herb. Drummond 14867 (K); (E); 14866 (K); (E); (G); Hazara, J. L. Stewart 119 a/H (K).

Baluchistan: Khojak Pass, Anar Killa Abdulla, Duthie 8631 (K).
Distribution: W.Pakistan, Punjab, N.W.F. Province, Baluchistan; *Afghanistan.*
Flowering Period: March-April.

13. **Astragalus (Falcinellus) subumbellatus** *Klotzsch* in Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: 159, t. 3.1862; Ali in Kew Bull. 1858 (2): 305.1958.

Description: Boiss. Fl. Or. 2: 231.1872; the description of *A. camporum* Benth. ex Boiss.

Holotype: Himalaya, Hoffmeister (B-untraceable).

Synonymy:

1. *Astragalus hippocrepedis* Benth. ex Bunge, Astrag. 1: 5.1868; 2: 3.1869.
2. *A. camporum* Benth. ex Boissier, Fl. Or. 2: 231.1872.

Figure Reference: Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: t. 3.1862.

Representative Specimens:

Punjab: Karewa, Pampur, 5,200′, Drummond 15033 (K); (G); (E); Kohat, Drummond 21916 (K); Naushera, Hazara, Duthie 21231 (K); Hazara, J. L. Stewart 119 (K).

N.W.F. Province: Seven miles from Peshawar, towards Khyber Pass, 20.3.1952, R. J. Rodin (K); Waziristan, J. L. Stewart 527/K to K (K).

Baluchistan: Ziarat, 8,500′, Lace 4035 (E); Ziarat, 8,000′, Crookshank 222(K); 195(K).

Distribution: W. Pakistan, Punjab, N.W.F. Province, Baluchistan; *Afghanistan.*

Subgenus **Tragacantha**

Borissova (1936, 1947, 1951) treats *Tragacantha* as a separate genus. However, other workers (Bunge, 1868, 1869, 1880; Boissier, 1872; Baker, 1876; Sirjaev, 1939; Parsa, 1948; Eig, 1955; Rechinger f. 1957) have maintained it as a subgenus. I have also treated it as a subgenus in the present treatment.

Artificial Key to the species:

1. Vexillum not panduriform, calyx teeth ±.6—.7 cm. (14) *A. ptilocephalus*
2. Vexillum panduriform, calyx teeth ±.2 cm. (15) *A. strobiliferus.*

14. **Astragalus (Tetracantha) ptilocephalus** *Baker* in J. Linn. Soc. (Bot.) 18: 47.1880.

Description: Baker in J. Linn. Soc. (Bot.) 18: 47.1880.

Holotype: Kurram valley, Shalizan to Habib Killa, 1879, Aitchison 433(K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Shalizan, 5,000′, Aitchison 15(K).

Afghanistan: Aitchison 55 (K).

Distribution: W. Pakistan, Kurram valley; *Afghanistan.*

Flowering Period: May.

15. **Astragalus (Tetracantha) strobiliferus** *Royle* ex Bentham in Royle, Illustr. Bot. Himal. Mount. 199.1835.

Description: Parker, For. Fl. Punj. 140.1924.

Holotype: Kanum in Kunawar, Royle (LIV; K).

Synonymy: Nil.

Figure Reference: Camb. in Jacq. Voy. Bot. t. 47.1844.

Representative Specimens:

Punjab: Piti, 13,000′, Upper Kunawar, 1852, Thomson (K); Hills above Chango, Piti, 27.8.47, Thomson (K).

Kashmir: 3,890 m. 15.9.1954, F. Schmid 2383(G).

N.W.F. Province: Chitral, Urghosh Dhok, Siddiqui and Rahman 26883 (RAW); Chitral, N. A. Qazilbash 1040 (K); Kurram valley, 6.6.1880, Aitchison 69 (BM).

Baluchistan: Wam, 7,000′, Sept. 1889, Lace (E); Kach, Lace 3820 (E). Himal. bor. occ., 10,000′—12,000′, Thomson (K); (BM); (G); N. W. India, J. L. Stewart (E); Ind. or., Jacquemont 1606 (K).

Distribution: W. Pakistan, N.W.F. Province, Baluchistan, *India*, N. Punjab; *Afghanistan*, Central, Eastern (Rechinger f., 1957); 8,000′—13,000′, temperate and alpine region.

Flowering period: July-August.

Subgenus **Calycophysa**

Artificial Key to the species:

1. Leaf paripinnate, petiole spiny, fruit unilocular	...	2
Leaf imparipinnate, petiole not spiny, fruit bilocular		3
2. Stipule .2—<.4 cm., acute	...	(16) *A. anisacanthus*
Stipule ±.5—.9 cm., acuminate	...	(17) *A. congestus.*
3. Calyx <1.5 cm. long (leaflets 31-37)	...	(18) *A. zarghumensis*
Calyx >1.5 cm. long	...	4
4. Leaflets broadly ovate to rotund, calyx teeth ±.6-.7 cm. long, cup±1.3-1.4 cm. long	...	(19) *A. kahiricus*
Leaflets elliptical, narrowly obovate, calyx teeth ±1-1.2 cm., cup±.6 cm. long	...	(20) *A. sericostachys*

16. **Astragalus (Poterium) anisacanthus** *Boiss.* Diagn. Pl. Or. Nov. ser. 1 (9): 103.1849.

Description: Boissier, Fl. Or. 2: 395.1872.

Holotype: In regno Cabulico, Griffith 1046 (K).

Synonymy:

1. *Astragalus jubatus* Boiss. Diagn. Pl. Or. Nov. ser. 1 (9): 104.1949.

Identity of A. jubatus Boiss:

A. jubatus Boiss. is typified by Griffith 1047 in Hook. Herb. Bunge (1868,

1869) has accommodated 'the specimens from Syrtsch and Diracht-indshan, in high mountains between Chabbis and Kerman, collected by Bunge and Bienert' under this species, though he realised that these specimens are slightly different from Griffith's specimens from Afghanistan. This has led him to believe that the fruiting calyx of *A. jubatus* Boiss. has twenty vertical veins. Boissier, who gave no consideration to the number of vertical veins in the fruiting calyx at the time of describing the species, accepts the diction of Bunge in his later publication (Boissier, 1872). Thus *A. jubatus* Boiss. has been accepted to be a taxon whose fruiting calyx has about twenty vertical veins (Bunge, 1868, 1869; Boissier, 1872; Parsa, 1948). However, the holotype observed at Kew reveals that there are only 10—12 nerves in the fruiting calyx, and it is definitely not conspecific with 'the specimens from Syrtsch and Diracht-indshan, collected by Bunge and Bienert', which has more than 20 nerves in the calyx, which I had the opportunity of seeing at Kew. Thus it is not correct to accept *A. jubatus* Boiss. for plants having about twenty nerves in the calyx. *A. jubatus* Boiss. is conspecific with A. *anisacanthus* Boiss.

Figure reference: Nil.

Representative Specimens:

Baluchistan: Quetta, 5,500′, H. Crookshank 131 (K); Kanozai valley, 2.5.1896, Duthie (K); Gurghina, Stocks 972 (K); near Quetta, Ved Prakash 16499 (RAW); Environs of Quetta, 30.4.54, F. Schmid 1561 (G).

N.W.F. Province: Hasan Din 181 (RAW); 182 (RAW); Waziristan, Barwand 4,000′, Harsukh 15636 (K); Waziristan, hill side near Anghar village, Meynell 1081a (K); North of Dosalli fort, 4,900, Waziristan, Blatter and Fernandez 1001 (K); East of Datta khel, fort, 4,600′, Waziristan, Blatter and Fernandez 1349 (K); Hills W. of Miram Shah fort, Blatter and Fernandez 16 (K); 17 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; *Afghanistan: Persia* (Parsa, 1948).

Flowering Period: September-April.

17. **Astragalus (Complyanthus) congestus** *Baker* in J. Linn. Soc. (Bot.) 19: 158.1882.

Description: Baker in J. Linn. Soc. (Bot.) 19: 158.1882.

Holotype: Kurram to Habibkalla, June 1st, 1880, Aitchison 25(K); (BM);

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Waziristan, 6.000′—7.000′, J. L. Stewart 157 K to K(K); Kaninguram, Waziristan, 6,500′, Harsukh 15758 (K); Dosalli Fort, 5,050′, Blatter and Fernandez 1081 (K); N. W. of Razmak camp, 6,800′, Waziristan,

Blatter and Fernandez 1732 (K); Para chenar, Kurram valley, Harsukh 14918 (K); Kaninguram, 6,500′, Waziristan, Duthie 15758 (K); Razani, 5,000′, Fernandez 2085 (BM).

Baluchistan: Pill Hill, 8,000′, Lace 3843 (E); Env. de Ziarat, 5—6.5.1953, F. Schmid 140 (G).

Distribution: W. Pakistan, N.W.F. Province, Baluchistan.

This is the first record of this species from Baluchistan.

Flowering Period: April-May.

18. **Astragalus (Alopecias) zarghumensis** *Rech. f.* in Biol. Skr. Dan. Vid. Selsk. 9 (3) : 131.1957.

Description: l.c.

Holotype: Baluchistan, Zarghum, 7,000′, 17.5.1893, Munro (DD-not seen).

Figure Reference: Rech. f. in Biol. Skr. Dan. Vid. Selsk. 9 (3), t. 152.1957.

Representative Specimens:

Baluchistan: Turshor, 9.5.1956, W. A. Dick-Peddie 147a (RAW).

Distribution: Endemic to Baluchistan.

Flowering Period: June.

19. **Astragalus (Eremophysa) kahiricus** *DC.* Prodr. 2: 292.1825.

Description: Boissier, Fl. Or. 2: 420.1872.

Holotype: Between Kahir and Soueys, Egypt, Delile (MPU-not seen).

There is no specimen in the de Candolle's Herbarium at Geneva. My observationa are based on Delile, Fl. Egypt: t. 39. f. 2.1812.

Synonymy:

1. *Astragalus longiflorus* Delile, Fl. Egypt: 112, t. 39. f. 2.1812. non Pallas (1800).

2. *A. isopetalus* Boiss. Diagn. Pl. Or. Nov. ser. 1(9): 67.1849.

Figure reference: Delile, Fl. Egypt: t. 39. f. 2.1812.

Rapresentative Specimens:

Baluchistan: Gurghina, Stocks 973 (K); Peshin, Lace 3582 (K); (E); Baluchistan, C. F. Elliot (K); Hindu Bagh, Shula Kila, Duthie 18831 (K).

Distribution: W. Pakistan, Baluchistan; *Afghanistan*; *Persia*; *Arabia*; *Israel*; *Egypt.*

Flowering Period: March-April.

20. **Astragalus (Alopecias) sericostachys** *Stocks* in Hook. J. Kew Gard. Misc. 4: 146.1852.

Description: Boiss. Fl. Or. 2: 414.1872.

Holotype: Doobund, between Kelat and Nooshky, Stocks 873 (K).

Synonymy: Nil.

Figure reference: Nil.

Distribution: W. Pakistan, Baluchistan; *Persia,* Mianeh.

Flowering Period: I have not seen any flowering specimens bearing the date of collection.

Subgenus **Podolotus** (Royle ex Benth.) Baker.

21. **Astragalus hosackioides** (*Royle ex Benth.*) *Benth.* in Benth. and Hcck. f. Gen. Plant. 1 (2): 507.1865. Ali in J. Bomb. Nat. Hist. Soc. 1958: 378—380.1958.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 123.1876. This description should be supplemented as follows: Peduncle 1-3, rarely 4-flowered.

Holotype: Mussorie, Royle (K).

Synonymy:

1. *Podolotus hosackioides* Royle ex Benth. in Royle, Illustr. Bot. Himal. Mount.: 198.1835.

2. *Kerstania nuristanica* Rech. f. in Biol. Skr. Dan. Vid. Selsk. 9 (3): 19.1957.

Figure Reference: Nil.

Representative Specimens:

Punjab: Mount Krol, 4,000′, Drummond 21918 (K); (E); (G); Murree, Lawrence Road, June, 1915, Saunders (K); Banni, Murree Hills, 6,000′, B. O. Zoventry (K); Chamba Shali, 8,000′, Collet 157 (K); Simla-Kalka, 4,000′, Drummond 24771 (K); Simla, Suni, 3,000′, Watt 9740 (E).

N.W.F. Province: Kohat, 3,000′, Drummond 21915 (K); Khil Tangi, Kurram valley, Harsukh 14982 (K).

Kashmir: Nakial, Poonch, 6,000′, A. Rashid and R. R. Stewart 25853 (RAW).

Kumaun and Garhwal: Nainital, 7,000′, Strachey and Winterbottom (K); Nainital, Thomson 586 (K); (BM); Nainital, 6,800′, Strachey and Winterbottom (K); (BM).

Distribution: W. Pakistan, N.W.F. Province, Punjab; *Kashmir*; *India*, N. Punjab, Kumaun; *Afghanistan*, Nuristan.

Flowering Period: April-June.

Subgenus **Astragalus**

Artificial Key to the species:

1. Flowers sessile, forming a compact head	...	2
Flowers pedicellate	...	7
2. Pods curved at the base (Fig. 2 A)	...	(22) *A. tribuloides*
Pods not curved at the base	...	3
3. Pod as long as the calyx, unilocular	...	(23) *A. leucocephalus*
Pod longer than the calyx, semibilocular	...	4
4. Calyx cup±.1—.2 cm. lower teeth±.4 cm. upper teeth±.25 cm., pod rugose (Fig. 2D)	...	(24) *A. contortuplicatus*
Calyx cup±.2—.25 cm., teeth±.2 cm. or less	...	5

5.	Leaflets emarginate; legume ovate ...	6
	Leaflets not emarginate, obtuse, rarely retuse; legume semilunar, arcuate ...	(25) *A. filicaulis*
6.	Legume glabrous (Fig. 2B) ...	(26a) *A. ammophilus* var. *ammophilus*
	Legume pilose (Fig. 2E) ...	(26b) *A. ammophilus* var. *persipolitanus*
7.	Ovary sessile ...	8
	Ovary stipitate ...	19
8.	Margin of the fruit spiny (Fig. 1E) ...	(27) *A. compositus*
	Margin of the fruit not spiny ...	9
9.	Pod curved inward abruptly near the tip (Fig. 3H)	10
	Pod not curved inward abruptly near the tip ...	15
10.	Vexillum appendiculate (Fig. 5A) ...	11
	Vexillum not appendiculate ...	12
11.	Pod 1.5—1.7 cm. long, septum extending only up to half of the length of the fruit (Fig. 3F) ...	(28) *A. gracilipis*
	Pod 2—3.5 cm. long, septum more than half the length of the fruit (Fig. 3H) ...	(29) *A. affghanus*
12.	Pod long and slender, .10—.2 cm. broad, slightly torulose ...	(30) *A. ophiocarpus*
	Pod more than .2 cm. broad, not torulose	13
13.	Pod glabrous corrugated (Fig. 3E) ...	(31) *A. corrugatus*
	Pod pilose, not corrugated ...	(32) *A. campylorhynchus*
14.	Pod glabrous ...	(33) *A. macropterus*
	Pod pilose ...	15
15.	Pod rugose (Fig. 2C) ...	(34) *A. densiflorus*
	Pod not rugose ...	16
16.	Bract longer than the calyx and fruit, fruit 2-seeded	(35) *A. melanostachys*
	Bract smaller than the calyx and fruit, fruit more than two seeded ...	17
17.	Inflorescence 1-3 flowered, fruit with white spreading hairs ...	(36) *A. orthocarpus*
	Inflorescence more than 5 flowered, fruit with black and white spreading hairs ...	(37) *A. tephrosoides* var. *lacei*
18.	Pod glabrous ...	19
	Pod pilose at least when young ...	23

19. Calyx teeth deltoid, less than 1 cm. long ... (38) *A. chlorostachys*
Calyx teeth not deltoid, longer than .1 cm. ... 20
20. Stipule not foliaceous, ±.1 cm. broad ... 21
Stipule foliaceous, ±.4 cm. or more broad ... 22
21. Pod 10-12 seeded, ±1.5-1.8 cm. long (excluding the stipe and the style) (Fig. 3D) ... (39) *A. bakeri*
Pod 6-8 seeded, ±.3 cm. or less long (excluding the stipe and the style) (Fig. 3B) ... (40) *A. stewarti*
22. Leaflets oblong to oblong-lanceolate, pod curved oblong (Fig. 4C) ... (41) *A. concretus*
Leaflets round elliptical ovate, pod straight, ensiform (Fig. 4B) ... (42) *A. graveolens*
23. Leaflets verticillate ... (43) *A. barbicalyx*
Leaflets not verticillate ... 24
24. Pod unilocular ... 25
Pod bilocular ... 31
25. Calyx teeth+.1 cm. or less ... (44) *A. frigidus*
Calyx teeth more than .1 cm. long ... 26
26. Wing smaller than the keel ... 27
Wing equal to or longer than the keel ... 29
27. Leaflets elliptical acute ... (45) *A. oxyodon*
Leaflets oblong, obtuse-truncate ... 28
28. Calyx teeth equal to or longer than the cup ... (46) *A. maddenianus*
Calyx teeth shorter than the cup (cup ±.3 cm., teeth ±.1—.2 cm.) ... (47) *A. himalayanus*
29. Pod semilunar ... 30
Pod not semilunar ... (48) *A. tenuicaulis*
30. Keel .5—<.7 cm. long ... (49) *A. strictus*
Keel ±.8—1.0 cm. long ... (50) *A. confertus*
31. Pod oblong, gibbous, whole plant covered with dense white spreading hairs ... (51) *A. munroi*
Pod not oblong gibbous, whole plant not covered with spreading hairs ... 32
32. Stipe longer than the calyx cup ... 34
Stipe shorter than the calyx cup ... 33
33. Calyx teeth ±.7—.8 cm., stipe of the pod ±.1 cm. hairs white spreading ... (52) *A. kashmirensis*
Calyx teeth ±.1—.3 cm., stipe of the pod ±.2—.4 cm., hairs black ... (53) *A. tibetanus*

34. Stipe of the fruit longer than twice the length of the calyx ... (54) *A. emodii*
Stipe of the fruit shorter than twice the length of the calyx ... (55) *A. maxwellii*

22. **Astragalus (Oxyglottis) tribuloides** *Delile*, Fl. Aegypt Illustr.: 70.1813.

Bunge (1869) reduced three species of Boissier *i.e.*, *Astragalus minutus* Boiss., *A. erpocaulos* Boiss. and *A. ammocryptos* Boiss. to synonymy of *A. tribuloides* Delile. The same arrangement was followed by Baker (1876). Boissier (1872) however, reduced two of these species to the varietal rank. He described (*i*) *A. tribuloides* var. *minutus* (Boiss.) Boiss. of which *A. erpocaulos* Boiss. was regarded as a synonym, and (*ii*) *A. tribuloides* var. *leiocarpus* Boiss. which is based on *A. ammocryptus* Boiss. Eig (1927) described a new variety, *A. tribuloides* var. *el-arishensis* Eig; later (Eig, 1955) he added one more variety, *A. tribuloides* var. *subpedunculatus* Eig. Thus in all recognising five varieties, which he distinguishes as follows:

A. tribuloides var. *typicus* Boiss (i.e. var. *tribuloides*): Pods 8-12 mm. long, hairy.
var. *el-arishensis* Eig: Pods 8-12 mm. long, glabrous.
var. *minutus* Boiss.: Pods 5-7 mm. long, hairy.
var. *leiocarpus* Boiss.: Pods 5-7 mm. long, glabrous.
var. *subpedunculatus* Eig.: Peduncle 5-15 mm. long, legume as in var. *typicus* (8-12 mm. long).

Var. *subpedunculatus* Eig has been described from Syria, but I have seen similar plants from W. Pakistan (Punjab, N.W.F. Province) Persia, Afghanistan, Jordan and Egypt. Therefore it is clear that this form is as widely distributed as the typical *A. tribuloides*. Moreover, it is not possible to distinguish it as a separate taxon because intermediate forms are consistently met with.

However, this group is divisible into two taxa according to the following characters: (*i*) *Taxon A.* with glabrous transversely-veined pods (*ii*) *Taxon B.* with pilose pods with obscure veins. These taxa are of specific rank. Infra-specific distinction is not possible because the characters considered by Eig are very arbitrary. The correct name of Taxon A appears to be *A. ammocryptus* Boiss. It will include *A. tribuloides* var. *leiocarpus* Boiss. and var. *arishensis* Eig. This taxon does not occur in the area under consideration. Taxon B should be known as *A. tribuloïdes* Delile. Its occurrence in W. Pakistan and N. W. Himalayas is given below.

Description: Kashyap, Lahore Dt. Fl.: 79.1936.

Type: Egypt, Delile (not seen).

Synonymy:

1. *Astragalus perpusillus* Bertol, Nov. Comm. Bonon 6: 230.1844.
2. *A. minutus* Boiss. Diagn. Pl. Or. Nov. Ser. 1 (9): 58.1849.

3. *A. erpocaulos* Boiss. 1. c.: 59.1849.

4. *A. kirghisicus* Stschegleew in Bull. Soc. Nat. Moscou, 27 (1): 161.1854.

5. *A. tribuloides* var. *minutus* (Boiss.) Boiss. Fl. Or. 2: 225.1872.

6. *A. tribuloides* var. *subpedunculatus* Eig in Syst. Stud. Astrag. Near East: 6.1955.

The type of *A. kirghisicus* Stsch. could not be seen. It has been listed here following Bunge (1869).

Figure Reference: Kashyap, Lahore Dt. Fl.: t. 63.1936.

Representative Specimens:

Baluchistan: Baluchistan, Stocks (K). Coast of Baluchistan, E. Pierce (K). Fort Sandeman, Harsukh 20501 (K). Sibi, 10.2.1889, Lace (E).

Punjab: Topi Park, Rawalpindi, 17,000′, R. R. Stewart 17271a (K). Campbellpur, Attock Dist., 1500′, R. R. Stewart 23608(K). Ludhiana, 1852, Thomson (K). E. of Firozepur, April, 1847, Thomson (K). Lahore, April, 1846, Thomson (K). Jhelum, Aitchison (K). Khangah Dogran, Gujranwala, R. R. Stewart 1448 (K). Sirsa, Dt. Hissar, Drummond 2229 (K). Katwahi, Dt. Shahpur, Drummond 14868 (K); (E); 14869 (K). Dhamyal, Rawalpindi, 1700′, M. Nath 17271 (RAW). Montgomery Dist., Bunga Hayat, 25.3.1891, Lace (E).

N.W.F. Province: Wana, 4,500, Waziristan, Duthie 15661 (K). Peshawar, 800′, R. R. Stewart 15390 (K). 7 miles from Peshawar, towards Khyber Pass, R. J. Rodin 5283 (K).

Kashmir: Gilgit Exped., Giles (K).

Distribution: Libya; *Tunisia*; *Egypt*; *Israel*; *Jordan*; *Syria*; *Iraq*; *Arabia*; *Persia*; *Afghanistan*; *Kashmir*; *W. Pakistan*, Baluchistan, Punjab, N.W.F. Province; *Russia*, Lower Volga, Transcaucasia, Aralo-Caspia, Kyzyl Kum, Kara Kum, Mountain Turkmania, Amu Darya foothills, Syr Darya foothills, Pamir Alai, Tien Shan (Gontscharov and Popov, 1946).

Flowering Period: February-April.

23. **Astragalus (Poliothrix) leucocephalus** *Grah.* ex Benth. in Royle, Illustr. Bot. Himal. Mount: 198.1835.

Description: Blatter, Beaut. Fl. Kashmir 1: 82.1927.

Lectotype: Rikeekes, Wall. 5923A (K).

Synonymy:

1. *Gueldenstaedtia leucocephala* Benth. ex Bunge, Astrag. 2: 76.1869, pro. syn.

Figure Reference: Royle, Illustr. Bot. Himal. Mount.: t. 33. f. 2.1835.

Representative Specimens:

Kashmir: Bagh, Azad Kashmir, R. R. Stewart and E. Nasir 23696 (RAW). Kashmir, EX Herb. Falconer (K).

N.W.F. Province: Hazara, Duthie 19341/a(K). Malkandi, Kagan, 4,500′, Duthis 21229/a(K). Peshawar, April, 1907, H. Deane (K). Waziristan, 6,000′, J. L. Stewart 231/k to K(K). Jambatai, Chitral Relief Exp., S. A. Harriss 16021 (K).

Punjab: Murree, 6,500′, 24.6.1922, R. R. Stewart (K). Kunawar, Royle (K). Spiti, 14,000′, H. A. C. Gill 2073 (K). Sao, 5,000′, Clarke 23568 (K). Simla, Madden (K). Naldehra, 7,000′, Gamble 5981A (K); 4397A (K); Jaunsar, 7,000′, Gamble 22834 (K); 26921 (K). Gothan Ridge, 7,000′, Lace 1693 (E); Krol, Drummond 4454 (K); 21890 (K); (E); (G); 21889 (K); Dake, Nanak, Drummond 20206 (K); Kangra valley, Drummond 21901 (K); (E); Ludhiana, Jun. 1847, Thomson (K); Pampur, Karewa, 5,300′, Drummond 15034 (K); (G); Murree Hills, 6,500′, R. R. Stewart 7643 (G); Kangra, Parbati valley, W. Koelz 4881 (G).

Kumaun and Garhwal: Garhwal, Ex Herb. Falconer (K); Nainital, Munro 438 (K); Nainital, April, 1844, Thomson 551 (BM); (K); Mussorie, 6,500′, Oct. 1916, J. Marten (E).

Distribution: W. Pakistan, N.W.F. Province, W. Punjab; *India*, Kumaun, E. Punjab; *Kashmir*; *Afghanistan.*

23. **Astragalus (Cycloglottis) contortuplicatus** L., Sp. Pl.: 758.1753.

Description: Cooke, Fl. Bomb. Pres. 1: 330.1902.

Type: Siberia, H. Ups. Ult. 926.21 (LINN).

Synonymy: Nil.

Figure Reference:

(*i*) Pallas, Astrag.: t. 79.1800.

(*ii*) Komarov et al. Fl. U. R. S. S. 12: t. 20. f. 3.1946.

Representative Specimens:

Punjab: Punjab, Edgeworth 2021 (K).

Sind: Sind, Stocks 406 (K).

Distribution: Central Europe, *Russia*, European Russia, Caucasus, Western Siberia, Central Asia; *W. Pakistan*, Punjab, Sind, Baluchistan (Bunge, 1869; Boissier, 1872).

In view of the distribution of this species in Europe and Siberia it seems very unlikely that it should occur in Sind and Punjab, though the specimens observed in Kew Herbarium perfectly agree with the European material.

Flowering Period: The specimens from Pakistan bear no date of collection.

25. **Astragalus (Oxyglottis) filicaulis** *Fischer and Meyer* ex Karelin and Kirilow in Bull. Soc. Nat. Mosc. 15: 336.1842; Ali in Kew Bull. 1958 (2): 305.1958.

In most of the floras this species is referred to as having been validly published in Ledebour's Flora Rossica, vol. I: 637. (Bunge, 1869; Boissier, 1872; Gontscharov and Popov, 1946). In Index Kewensis this species has been

listed twice, first in Vol. I (1895) as '*A. filicaulis* Fisch. and Mey. Enum. Pl. Turc. et Pers. 256'. This list of plant names was published in 1839 by Karelin in Bull. Soc. Nat. Moscou. 12: 152. The name appears for a second time in Suppl. 10 as follows: '*A. filicaulis* Fisch. and Mey. ex Karel. in Bull. Soc. Nat. Mosc. 1839. XII. 152, nomen; Ledeb. Fl. Ross. 1: 637 (1842)'. Another place where this name was validly published and which has been overlooked by most workers is in 'Bull. Soc. Mosc. 15: 336. 1842' by Karelin and Kirilow.

It is to be noted that Ledebour's Flora Rossica Vol. I has been taken to have been published in 1842, the date that is given on the title page. However, according to Stearn (1941) pages '481-790' of this work were published in 1843 (probably March). Therefore the date of publication of '*A. filicaulis* Fisch. and Mey. ex Ledeb. Fl. Ross. I: 1637' is 1843 (probably March) and not 1842. Therefore Karelin and Kirilow were the first to have validly published this species and the correct citation of this name will be "*Astragalus filicaulis* Fisch. and Mey. ex Kar. and Kir. in Bull. Soc. Mosc. 15: 336.1842."

Description: Boiss. Fl. Or. 2: 227.1872.

Type: In view of the changed citation of the second author the matter of the typification requires careful consideration. Karelin and Kirilow have cited the following two specimens: 'North Turcomania Karelin; Mt. Arganaty, Songaria, June, 1841, Karelin and Kirilow 262'. Both of these specimens are presumably in Leningrad. It is necessary to compare the description (as given by Karelin and Kirilow) with the specimens and then one of the specimens should be chosen as lectotype. However, as I did not have access to these specimens, the matter will have to be left to a more privileged worker.

I have not seen any authentic specimens. My observations are based on Griffith's specimens cited by Bunge (1869) and Boissier (1872).

Synonymy:

1. *Astragalus leptodermus* Bunge, Astrag. Turk.: 208.1880.
2. *A. agrestis* Freyn in Bull. Herb. Boissier (2 Ser.) 4: 446.1904.

The types of the synonyms listed above have not been seen. They have been listed following Lipsky (1910) Popov (1928) and Gontscharov and Popov (1946).

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Killa Abdulla, 5,200', Lace 3547 (E). Peshin, 1.4.89. Lace (E).

N.W.F. Province: Landi Kotal, 3,500', D. Lowndes 1717 (E).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; *Persia: Afghanistan; Russia,* Aralo-Caspia, Balkash, Syr Darya foothills, Tien Shan, Pamir

Alai, Mountain Turkmenia, Kyzil Kum (Gontscharov and Popov, 1946) (Map 41).

Flowering Period: March-April.

Chromosome Number: $n = 8$ (Tschechow, 1935).

26. **Astragalus (Oxyglottis) ammophilus** *Kar. and Kir.* in Bull. Soc. Nat. Moscou 15: 335.1842; Ali in Kew Bull. 1958 (2): 306.1958.

(*a*) *var.* **ammophilus**

Description: Boiss. Fl. Or. 2: 228.1872. This description should be amended as follows: Pods glabrous.

Holotype: Songoria, Sassyk-pastau and Arganaty, Alatau, 1841, Karelin and Kiriloff 261 (LE-not seen).

I have seen 'Karelin and Kiriloff 1386' in the herbaria of Kew and Geneva.

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Afghanistan: Harirud valley, Aitchison 322, 407 ex parte (BM) *Russia:* Azerbaijan, Nakhichevanskaya ASSR Norashenskii raion, Kadak-yal, Arpachai, 900 m. 8.5.1947, A. A. Grossheim, I. A. Ilinskaya and M. I. Kirpichinkov (BM).

Persia: 'Ruinis templi urbis Persipolis in Persia Australi,' Kotschy 226.837 (G).

Distribution: Afghanistan; *Russia*; *Persia.*

Flowering Period: April.

(*b*) var. **persipolitanus** (*Boiss.*) *Ali* in Kew Bull. 1958 (2): 306.1958.

Holotype: 'Ruinistem pli urbis Persipolis in Persia australi, Kotschy 226, Herb. Boissier (G).

Figure reference: Nil.

Representative Specimens:

Baluchistan: Stocks, 1085 (G); 1085B (K); 1085C (K); killa Abdulla, 5100', Lace 3322 (K); (E); Killa Abdulla, Duthie 863 (BM).

Afghanistan: Aitchison 407 (K); Harirud valley, Aitchison 322.407 ex parte (BM).

Persia: Pr. Sser-tschah, March 1859, Ex Herb. Bunge (K); (G); near Shiraz, 5,000', A. C. Prott 947 (K); Prov. Kerman, 2000 m. Bornmuller 3755 (K).

Persian Auf den Hügel Musella bei Hamadan, Pichler 209 (G).

Distribution: W. Pakistan, Baluchistan; *Afghanistan*; *Persia*; *Russia* (Grosshein, 1946).

27. **Astragalus (Swerzowia) compositus** *N. Pavlov* in Bull. Soc. Nat. Moscou 44: 33.1935; Ali in Kew Bull. 1958 (2): 307.1958.

Description: N. Pavlov in Bull. Soc. Nat. Moscou 44: 33.1935.

Holotype: 'Montes Karakau in decliviis argillo rubro constructis ad faucem angustis Kzyl-ata prope pag. Atabajevo 15.5.1930, fl. et fr. exs. no 204, lg. S. Lipschitz (MW-not seen).

I have not seen any specimen of this species from Central Asia. My conclusions are based on the description of this species as given by N. Pavlov (1935) and Gontscharov and Popov (1946). In this connection my thanks are due to Dr. A. Melderis of British Museum (Natural History) who kindly translated the Russian description of this species from the 'Komarov et al. Flora of U. R. S. S. vol. 12.1946'.

It is to be noted (*i*) that according to this description (Gontscarov and Popov, 1946) 'the inflorescence is as long as the leaf or somewhat shorter', while in the specimens from Pakistan the inflorescence may be longer than the leaves, and (*ii*) that according to the description rarely 1, generally 2-6 flowers are present per raceme, while in the specimens from Pakistan as many as 13 flowers may be present. When more specimens are available, a detailed study of these characters will be essential.

Synonymy:

1. *Astragalus vicarius* var. *dissitiflorus* M. Popov in Bull. Univ. As. Centr. 14: 129.1926.

I have not seen any authentic specimens of this variety. It has been listed her following Gontscharov and Popov (1946).

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Swat, April, 49. Lahore students with Prof. Mohd Salim 86 (RAW); Mingora 11.4.54, Collector unknown (LAH).

Distribution: W. Pakistan, Swat; *Russia*. Tien Shan (Gontscharov and Popov, 1946) (Map 51).

Flowering Period: April.

28. **Astragalus gracilipis** *Benth.* ex Bunge, Astrag. 1: 15.1868; 2.17.1869.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 122.1876.

Holotype: Tibet occ., 10—14,000', Thomson (LE-not seen). I have seen specimens from "Tibet occ. 10—11,000'", collected by Thomson, in Kew Herbarium.

Synonymy: Nil.

Figure reference:

Kashmir: Zenskar, 12,000', 28.6.1848, Thomson (K), Tibet occ. 11—14,000', Thomson (K); (BM); (E); (G). Rupshu, valley below Hule, 14,000', 17.9.1847, Thomson (K). Ladakh, 11,000' 7.7.1848, Thomson (K). West of Leh, Indus valley, 11,000', Zanskar, 12,000', 1852 Thomson (K).

N. Punjab: Piti, Changar, 12,000′, 29.8.1847, Thomson (K).

Baluchistan: Kila Abdulla 5,000′, Lace 3347 (K); (E).

Distribution: Kashmir; *W. Pakistan*, Baluchistan; *India*, N. Punjab (Map 52).

This is the first record of this species from Baluchistan.

It is desirable to point out that all the material cited above from 'Tibet occ.' was collected by Dr. Thomson. His exploration in that area was confined between 75-78°E and 31-35′35N (Hemsley, 1902). This area is now referable to Kashmir.

Flowering Period: April-June.

29. **Astragalus affghanus** *Boiss.* Fl. Or. 2: 1095.1872.

Description: Boiss. Fl. Or. 2: 235.1872. The description of *A. brahuicus* Boiss.

Holotype: Baluchistan, Stocks 716 (K); (G).

Synonymy:

1. *Astragalus brahuicus* Boiss. Fl. Or. 2: 235.1872, non Bunge (1868).

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Kila Abdulla, 5,100′, Lace 3321 (K); (E).

Distribution: Endemic to Baluchistan.

Flowering Period: March-April.

30. **Astragalus (Ophiocarpus) ophiocarpus** *Benth.* ex Bunge, Astrag. 1: 10.1868; 2: 6.1869.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 122.1876. This description should be amended as follows: Seeds 10-20 per fruit.

Lectotype: Tibet Occidentali, 11,000′, Thomson (LE-not seen) (K).

Synonymy:

1. *Astragalus aitchisonii* Baker in Hook. f. Fl. Brit. Ind. 2: 121.1876.
2. *A. paulsenii* Freyn in Bull. Herb. Boiss. Ser. 2, 4: 445.1904.
3. *Trigonella komarovii* Lipsky in Acta Horti petropol. 26 (2): 125.1910.

The types of *A. paulsenii* Freyn and *Trigonella komarovii* Lipsky could not be seen. These have been listed here following Popoy and Vvedensky (1921) and Gontscharov and Popov (1946).

Figure reference: Nil.

Representative Specimens:

Punjab: Salt range, Aitchison 76 (Holotype of *A. aitchisonii* Baker) (K). Hussar, Rawalpindi, Aitchison 1041 (K). Cambellpur, Attock Dist., R. R. Stewart 7745 (RAW).

N.W.F. Province: Cambellpur, Dera Ismail Khan, 1000′, 7000′, H. A. Deane 26(K). Pezu, A. Rahman 25901 (RAW).

Kashmir: Ladakh 1852, Thomson (K). Ashkoley, 10050, Karakoram, Clarke 30484 (K); Tibet Occ., 11,000′, Thomson (E); (BM); (G).

Baluchistan: Quetta, Watt (E). Quetta, Lace 30 (E).

Distribution: W. Pakistan; Punjab, N.W.F. Province, Baluchistan; *Kashmir*; *Persia*; *Iraq*; *Russia*, Kyzyl Kum, Mountain Turkmenia, Syr Darya foothills, Pamir Alai, Tien Shan (Gontscharov and Popov, 1946); *Afganistan* (Boissier 1872).

Flowering Period: March-April, rarely till August.

31. **Astragalus (Harpilobus) corrugatus** *Bertol*, Rarior. Ital. Plant. 3: 30.1810.

Description: Boiss. Fl. Or. 2: 232.1872.

Holotype: 'Cultivated from the seeds received from Botanical Garden, Paris, Bertoloni (BOLO-not seen).

Synonymy:

1. *Astragalus quadrisulcatus* Bunge, Arb. Naturf. Ver. Riga 1: 248. 1847.
2. *A. cruentus* Balb, Cat. Strip. Hort. Acad. Taur. App. 1: 8.1813 (nom. nud).

Figure reference: Komarov et al., F., U.R.S.S. 12: t. 21, f. 9.1946.

Representative Specimens:

Baluchistan: Peshin, 5,200′, Lace 3474 (K); (E). Baluchistan, Stocks (BM); 572 (K). Quetta maidan, 5,500′, Crookshank 39 (K). Khanai near Quetta, Ved Prakash 16498 (RAW). Shebo, April 1889, Lace (E). Quetta, Lace 3627 (E).

Distribution: W. Pakistan, Baluchistan; *Afghanistan*; *Persia*; *Russia*, East Transcaucasia, Kyzyl Kum, Kara Kum, Pamir Alai; *Egypt* (Tackholm, 1956); *Iraq* (Zohary, 1950; Eig. 1955); *Arabia* (Blatter, 1921); *Transjordan* and *Palestine* (Post and Dinsmore, 1932; Eig. 1955).

Flowering Period: March-April.

It is to be noted that *A. corrugatus* Bertol as used here does not include *A. tenuirugis* Boiss. The latter species was treated as a variety by Cosson and Kralik (1857) and a subspecies by Eig (1955) under *A. corrugatus* Bertol.

32. **Astragalus (Harpilobus) campyylorrhynchus** *Fisch. et Mey.* Ind. Sem. Hort. Petropol. 1: 23.1835.

Description: Boissier, Fl. Or. 2: 233.1872.

Holotype: Province Azerbaijan, Persia, Szovits (LE-not seen).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Stocks 1146 (K). Kila Abdulla, 5,100′, Lace 3320 (E).

N.W.F. Province: Khyber Pass (34°N. latitude), 3,600′, H. H. Johnston 33 (K).

Distribution: Persia; *Afghanistan*; *Russia*, South Transcaucasia, Pamir

Alai, Tien Shan, Mountain Turkmenia, Syr Darya foothills, Arelo Caspia and Kyzyl Kum (Gontscharov and Popov, 1946); *W. Pakistan*, Baluchistan, N.W.F. Province.

Flowering Period: April.

Chromosome number: $n=18$ (Tschechow, 1935).

33. **Astragalus (Hemiphaca) macropterus** *DC.* Prodr. 2: 283.1825.

Description: Blatter, Beaut. Fl. Kash. 1: 86.1927.

Lectotype: Dahuria, 1822, Fischer (G).

Syntype: Siberia Scythica, 1825, Fischer (G).

Synonymy:

1. *Astragalus vicioides* Ledeb. Fl. Alt. 3: 301.1831.
2. *A. longipes* Kar. and Kir. in Bull. Soc. Nat. Moscou. 1841: 405.1841.
3. *A. macropterus* var. *septentrionalis* Lipsky in Acta Horti petropol. 26: 211.1910.
4. *A. distans* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2: 128.1876. pro syn.

Figure Reference: Ledeb. Ic. Pl. Fl. Ross. 3: t. 286.1831.

Representative Specimens:

Kashmir: Baltistan, Paskyum, 9,600′, Osmaston 121 (K). Zanskar, 12,000′, 1852, Thomson (K). Ladakh, Indus valley. 9—11,000′, 1852, Thomson (K). Shah Janali, 9—11,000′, Gilgit Exped., Giles 438 (K). Tibet Occ., 12,000′, Thomson (K); (BM). Gilgit, Ishkoman, Aug. 1954, F. Schmid (RAW). Ladakh, Namika La, W. Koelz 6191 (G). Imit, 2900 m. 2—3.8.1954. F. Schmid. 2071 (G).

Distribution: Kashmir; *Russia*, Irtysh, Altai, Angara-Sayan, Balkash, Pamir Alai, Tien Shan, Dzungaria-Tarbagatai; *Chinese Turkistan* (Gontscharov and Borissova, 1946) (Map 55).

Thomson's specimens bearing the label 'Tibet Occ.' were collected in 'Little Tibet' (Baltistan) now referable to Kashmir (Hemsley, 1902).

Flowering Period: June-July.

34. **Astragalus (Hemiphaca) densiflorus** *Kar. and Kir.* in Bull. soc. Nat. Moscou, 15: 329.1842.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 125.1876.

Holotype: Near the river Lepsa and Sarchan, Alatau. 1841, Karelin and Kirilow (LE-not seen). *Isotype:* Near the rivers Lapsa and Sarchan, Alatau, 1841, Karelin and Kirilow 1378 (K).

Synonymy: Nil.

Representative Specimens:

Kashmir: Indus valley, 14,600′, 1852, Thomson (K). Sassar Pass, 15,000′, 13.8.1848, Thomson (K). Zanskar, 12,000′, 28.6.1848, Thomson (K).

Ladakh, 13,000′—14,000′, Thomson (K). Zaskar, Kargia, 13,500′, W. Koelz 5438 (G).

Punjab: Kunawar, July, 1844, Munro 679 (K). Lahul, Jaeschke 39--2nd. Collection (K).

Distribution: Kashmir; *India*, N. Punjab; *W. Tibet*; *Russia*, Dzungaro-Tarbagatai, Tien Shan (Borissova, 1946); *E. Turkistan.*

Baker (1876) and Blatter (1927) have reported it from Afghanistan, but I have not seen any specimen from there.

Flowering Period: June-August.

35. **Astragalus (Hemiphaca) melanostachys** *Benth.* ex *Bunge*, Astrag. 1: 21.1868: 2: 22.1869.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 125.1876.

Holotype: Himalaya, Hoffmeister (B-not seen).

Synonymy:

1. *Astragalus bracteosus* Klotzsch in Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: 160, t. 5.1862, non Boiss. and Noe (1856).
2. *Phaca microcarpa* Strachey and Winterbottom ex Bunge, Astrag. 2: 22.1869. pro. syn.
3. *Astragalus macrostegius* Rech. f. in Biol. Skr. Dan. Vid. Selsk. 9 (3): 37.1957.

I have not seen the type specimen but a perusal of the description indicates that it is the same as *A. melanostachys* Benth. ex Bunge.

Figure Reference: Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar: t. 5. 1862.

Representative Specimens:

Kashmir: Baltal, 9,500′, 27-9-1848, Thomson (K). Mitsahoi, 13,000′, R. R. Stewart 7566 (K). Baltistan, Golteri Nallah, Shingo valley, 11,000′, Duthie 11,874 (E); (BM). Dras valley, 10—11,000′ Duthie 13685 (BM); (E). Zanskar, Rangdhum, 15,000′, W. Koelz 2910 (E). Zaskar, Seni 12,000′, W. Koelz 5771 (G).

N.W.F. Province: Och Anzog, 3600m., 12-7-1950, Wendelbo (K); (BM). Swat state, Sho Nallah near Kalam, 9,000′, R. R. Stewart and Rahman 25271 (BM); (RAW). 'Prov. Chitral, haute vallee de Yarkhun, Hauts pâturages, 4000m. 22—27-8-1954, F. Schmid 2328 (G).

Punjab: Sissu, 12,000′, Lahul, Bor 12394 (K); (E). Lahul, Jaeschke 42 (K). Lahul, Pinker 10,300′, Bor 15492 (E).

Kumaun and Garhwal: Rhudughera, 10—11,000′, Duthie 987 (K). Water course near Jangla, Duthie 987a (BM).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India*, N. Punjab, Kumaun, Garhwal; *Tibet*; *Russia*, Pamir Alai (Borissova, 1946).

Flowering Period: June-August.

36. **Astragalus (Christiana) orthocarpus** *Boiss.* Diagn. Pl. Or. Nov. Ser. 1 (9); 68.1849.

Description: Boiss. Fl. Or. 2: 276.1872.

Holotype: Afghanistan, Griffith 1060, Ex. Herb. Hook. (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: 'On way to Ziarat from Quetta, stony grounds, 7,000', plants 1-2' tall, common, 23-6-1957, Jafri and Akbar (E).

Distribution: Afghanistan; *W. Pakistan*, Baluchistan.

Flowering Period: The above specimen which is in fruiting stage was collected in June.

37. **Astragalus (Astragalus) tephrosoides** var. **lacei** *Ali* in Kew Bull. 1858 (2): 307.1958.

This variety can easily be distinguished from var. *tephrosoides* by the shape and size of leaflets. In var. *lacei* Ali the leaflets are obovate and the ratio of the length and breadth of the leaflets is less than 2 (1.3-1.9); whereas in var. *tephrosoides* the leaflets are oblong to ovato-oblong and the ratio of the length and breadth of the leaflets is more than 2 (2.2-2.8).

Holotype: Baluchistan, Ziarat, 8,000', 1-6-1888, J. H. Lace 3863 (E).

Representative Specimens:

Baluchistan: Urak, Zarghones, 9,000', 29.6.'52. H. Crookshank 398 (K).

Flowering Period: May-June.

38. **Astragalus (Chlorostachys) chlorostachys** *Lindl.* in Trans. Hort. Soc. 2: 249.1830.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 128.1876.

Holotype: Cultivated in Chiswick gardens, from the seeds received from Nepal in 1925 (CGE).

My thanks are due to the authorities of Botany School, University of Cambridge, Cambridge, for the loan of the type specimen.

Synonymy:

1. *Hedysarum strobiliferum* Baker in Hook. f. Fl. Brit. Ind. 2: 146.1876.
2. *Astralagus govanianus* Grah. in Wall. Cat. 5925 (nom. nud.)
3. *A. himalensis* Jacquemont MSS. (nom. nud.)

Figure reference: Nil.

Representative Specimens:

N.W.F. Province: Makra, Kagan, Duthie 21232A (K). Bishigram, 6—7,000'. Swat, R. R. Stewart and A. Rahman 24917 (BM); (RAW). Deoli, Hazara, 25-8-1899, Duthie (K).

Punjab: Murree, E. M. Saunders (K). Changla gali, Murree hills, 8,000′, 12-9-1957, R. R. Stewart (K). Dalhausie, Clarke 2260 (K); 22660 (BM); 22499 (BM). Kunawar, Drummond 21912 (K); (E). Kufri, H. H. Rich 293 (K). Sissu, 10,100′, Lahul, Bor 12301 (K); (E). Kyelang, Lahul, 11,000′, Bor 14916 (K); (E).

Kashmir: Pahlgam, 7,200′, R. R. Stewart 5437 (K); 21671 (K). Pahlgam to lake Sorus, 10—11,000′, R. R. Stewart 21579A (K). Sonamarg, 9,000′, R. R. Stewart 6406 (K). Dunga gali, Aug. 1880, A. P. Young (BM). Gagangir, Sind valley, 8,000′, Ludlow and Sherriff 8038 (BM). Lidder valley, above Pahlgam, 8—9,000′, Duthie 13470 (BM); (E).

Kumaun and Garhwal: Gori valley, Duthie 24307 (K); Tilone Khal, Garhwal, 6,000′—7,000′, Edgeworth 73 (K); Kutti, Yangti valley, Byans, Duthie 5470 (K); Tolu, 11,500′, Strachey and Winterbottom 5 (BM); Rhudugheru, 10,000′—11,000′, Duthie 989 (BM); Kedar nath, Kirt Ram 8931 (E); Nainital, 6,000′, A. Meebold 1398 (G).

Distribution: W. Pakistan, N.W.F. Province, Punjab; *Kashmir*; *India*, N. Punjab, Kumaun, Garhwal; *Nepal.*

Flowering Period: June-October.

39. **Astragalus (Chlorostachys) bakeri** *Ali* in Kew Bull. 1958 (2): 307.1958.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 129.1876; the description of *A. longicaulis* Baker.

Holotype: Kashmir, July, 1938, Falconer (K).

Synonymy:

1. *Astragalus longicaulis* Baker in Hook. f., Fl. Brit. Ind. 2: 129.1876. non Pomel (1874).

Figure Reference: Nil.

Representative Specimens:

Kashmir: Kunslwan, 7,750′, Clarke 29428A (K); 29428 (BM); Sind valley to Sonamarg, 8,000′, R. R. Stewart 3430 (K).

Distribution: Kashmir.

Flowering Period: May-August.

40. **Astragalus (Chlorostachys) stewartii** *Baker* in Hook. f. Fl. Brit. Ind. 2: 129.1876.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 129.1876.

Holotype: Hazara, temperate region, 5—9,000′, J. L. Stewart (K-not seen).

I have not seen the above specimen in Kew Herbarium. However, there exists 'Punjab, Ex. Herb. J. L. Stewart, comm. 3.1871' which bears *A. stewartii* in the handwriting of Baker.

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Punjab: Punjab, Comm. 3.1871, Ex. Herb. J. L. Stewart (K).

Kumaun: Byans, near Kuti, 12—13,000′, Duthie 2811 (K). Byans, near Kuti, 11,500′, J. R. Reid 35 (E).

Distribution: W. Pakistan; Punjab; *India*, Kumaun 5,000′—14,000′ (Blatter, 1927).

Flowering Period: August-September (Blatter, 1927).

41. **Astragalus (Chlorostachys) concretus** *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

Description: The description of *Astragalus vicioides* Grah. ex Baker as given by Baker in Fl. Brit. Ind. 2: 131.1876.

Holotype: 'Emodo and Gosainthan', Wallich 5931 (W-K).

Synonymy:

1. *Astragalus vicioides* Grah. ex Baker in Hook. Fl. Brit. Ind. 2: 131.1876 non Ledebour (1831).

2. *A. isabellae* Dunn, Kew Bull. 1924: 384.1924.

Baker (1876) and Blatter (1927) have adopted the specific epithet *Astragalus vicioides* Grah. ex Baker, which is not valid, not only because it is antedated by *A. concretus* Benth., but also because it is a latter homonym of *A. vicioides* Ledebour (1831).

Dunn (1924) has erroneously redescribed this species under the name of *A. isabellae* Dunn. The comparison of the type specimens has convinced me that *A. concretus* Benth. and *A. isabellae* Dunn are conspecific.

Figure reference: Nil.

Representative Specimens:

Kashmir: Goorai, 9,000′, Clarke 29292B (K). Pahlgam, narrow nallah to left of Dum Pathar, R. R. Stewart 5972. (Type of *A. isabellae* Dunn) (K); Pahlgam, R. R. Stewart and I. D. Stewart 5972 (K). Soonamarg, 9,500′, R. R. Stewart 7201 (K). Pahlgam, 10,000′, R. R. Stewart and I. D. Stewart 5606 (K). Pahlgam, 7—8,000′, R. R. Stewart 21,744 (K). Pahlgam, 7,000′, Coventry 1363 (K). Sangui et Rorang, 3,000′, Jacquemont 1443 (K). Kishtwar, 8,000′, Thomson (K). Kashmir, Falconer (K).

Distribution: Kashmir; *Tibet*, Gossainthan.

Flowering Period: July-August.

42. **Astragalus (Diplotheca) graveolens** *Buch.-Ham.* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 131.1876.

Holotype: Bank of Rapti, Hamilton (K-W).

Synonymy:

1. *Astragalus rotundifolius* Royle ex Benth. in Royle, Illustr. Bot. Himal. Mount.: 199.1835.
2. *A. medullaris* Boiss. Diagn. Pl. Or. Nov. Ser. 1 (9): 66.1849.
3. *A. bodinieri* Levl. in Bull. Ac. int. Geogr. Bot. 24: 49.1915.

Figure Reference: Blatter, Beaut. Fl. Kashmir, 1: t. 19. f. 3.1927.

Representative Specimens:

Kashmir: Kashmir, Ex. Herb. Falconer (K). Chenab Valley, 9,000′, 1852. Thomson (K). Dida Stream, 8,000′, Upper Chenab, Baden-Powell 102 (K). Himal. Bor. Occ. 4—9,000′, Thomson (K); (BM). Jhelam valley Road, 4,500′, R. R. Stewart 5099 (K). Deodar forest, 9,000′, 1915, Prescot-Decie (BM).

N.W.F. Province: Hazara, 3—4,000′, J. L. Stewart 170 (K). Gujar Gunai village, Kurram valley, Harsukh 14991 (K). Jambatai, 6,000′, Chitral Relief Exp., S. A. Harriss 16016 (K). Madaglast, 9,000′, Chitral, Toppin 498 (K). Kurram valley, Aitchison 241 (K). Near Karora, Swat, 3,500′, A. Rahman 25904 (RAW).

Punjab: Punjab, Drummond, 20065 (K); 21893 (K); (E); (G); 21904 (K); 21897 (K); (E); (G); 21898 (K). Urni, Punjab, Drummond 21905 (K). Karnal, Drummond 21894 (K); 21892 (K); 21896 (K); (E). Rasol, Kulu, Lahul, Drummond 23491 (K); (G). Buria, Ambala, 4,000′—9,000′, Edgeworth 70 (K). Pangi, Kunawar, 9,000′, 18-8-1847, Thomson (K); Bashahr, Ralli, 6,500′, Lace 211 (E). Chamba State, Teesa, 5,000′, Watt 654 (E). Kulu, Kangra, 4,500′, W. Koolz 4627 (G).

Kumaun and Garhwal: Below Nainital, 5,000′, Strachey and Winterbottom 2 (K); Dhauli River Garhwal, 9,000′, Strachey and Winter-bottom 3 (K). Garhwal, Ex. Herb. Falconer 419 (K). Mussorie, April, 1915, A. Anderson (E); Mussorie, J. Menton (E).

Baluchistan: Baluchistan Hills, Stocks 714 (K).

Distribution: W. Pakistan, W. Punjab, N.W.F. Province, Baluchistan; *Kashmir*; *India*, E. Punjab, Kumaun; *Afghanistan*; *China*, Yunnan.

Flowering Period: May-August.

43. **Astragalus (Heterozyx) barbicalyx** *Ali* in Kew Bull. 1958 (2): 308.1858.

Description: The description of *A. verticillaris* Bunge as given by Boissier in Fl. Or. 2: 264.1972. This description should be supplemented with the description of the fruits, described here for the first time as follows:

Pod stipitate, stipe±.2-.3 cm. Pod (without stipe) 2.1-2.4 cm. (including the apical mucro) long,±.6-.7 cm. broad, elliptical, uniformly pilose; hairs white, partially bilocular, septum incomplete,±.4 cm. broad; 8 seeded. *Seed* ±.4-<.5 cm. long,±.2-.3 cm. broad, reniform, glabrous, chestnut brownpale brown in colour.

Holotype: Koshak pass, Griffith 1588 (K).

Synonymy:

1. *Astragalus verticillaris* Bunge, Astrag. 1: 53.1868; 2: 88.1869, non Linn. (1771).

2. *A. kurrumensis* Bunge in Acta Horti petropol. 7: 370.1880.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Khojak pass, Duthie 8636 (K). Shelabagh, 11-4-88. Duthie 8636 (G). Shelabagh, 6000′, 11-4-88, Lace 3527 (E).

N.W.F. Province: Kurram valley, profuse in pine forests on Pewarkotal, 6—8,000′, Aitchison 421 (K).

Distribution: Afghanistan; *W. Pakistan*, Baluchistan, N.W.F. Province.

Flowering Period: April-May.

44. **Astragalus (Cenantrum) frigidus** (*L.*) *A. Gray* in Proc. Amer. Acad. Sc. 6: 219.1864.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 130.1876.

Type:

Linnaeus (1759) has not given any indication about the *locus classious* and there is no specimen in the Linnean Herbarium (LINN) either which could be accepted as the type of this species. In view of the fact that there exist parts of the Linnaean Herbarium in Stockholm, Paris etc., which I have not been able to examine, I have refrained from selecting the neotype.

Synonomy:

1. *Phaca frigida* Linn Syst. Nat. ed. 10 (2): 1173.1759.

2. *P. alpina* Linn. Sp. pl. : 755.1753.

3. *P. ochreata* Crantz, Strip. Austr. ed. 2, fasc. 5: 419, t. 2, f. 2.1769.

4. *Colutea frigida* (Linn) Poirt in Lamk. Encycl. Meth. Suppl. 1: 561.1810.

Figure reference: Hegi, illustr. Fl. Mittel-Europa, 4 (3): t. 1467, 1468.1923.

Representative Specimens:

Kashmir: Above Rama, 11,000′, Astor Dt. R. R. Stewart 22906 (K); N.W. of Pensi La in Zanskar, 12—14,000′, Stoliczka (K); Karakorum, 14,000′, Clarke, 30452C (K); 30242 (K); Gilgit, Tanner, 148 (K); Suru, Sirimarg, R. R. Stewart, 290 (K); Thale La to Bagmaharal, N. E. of Skardo and Shigar, Balti, Schlagintweit 594 (BM); Padri Pass to Bhadrar, Dzamu, Schlagintweit 3141 (BM); Biagdang nallah, Shyok River, Baltistan, 11,500′ Ludlow 385 (BM); Upper Satpura nallah, 13—14,000′, R. R. Stewart 20329 (RAW); Zaskar, Char, 13,000′, W. Koelz 5698 (G).

N.W.F. Province: Chitral, Och. Anzog, c. 3600m. 12.7. 1950 Wendelbo (K).

Punjab: Rangcha galli, 14,500′, Lahul, Bor 14018 (K) (E); near Pasparag, Kulu, Drummond 23484 (K); (G).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *China*, Yunnan, Szechuan, (Peter-Stibel, 1938); *India*, N. Punjab; *Russia*, Siberia, Anadyr, Karelian Lapland, Dvina-Pechora, Okhotsk and Kamchatka; *Balkan Peninsula*; *Asia Minor*; *Norway*; *Denmark*; *Sweden*; *Finland*; *Estonia*; *Latvia*; *Germany*; *Lithuania*; *Poland*; *Czechoslovakia*; *Hungary*; *Austria*; *Switzerland*; *Canada*; *U.S.A.*; Rocky Mountains from Yukon to Wyoming, South Dakota, Gaspe Peninsula, Quebec, Coronation Gulf to Bering Strait, South to Mount St. Elias, (Rydberg, 1929; Hooker, 1833; Barnbey, 1952) (Map 51).

Flowering Period: July-September.

Chromosome number: $n=8$ (Love and Love, 1944).

As stated above, it is a very widely distributed species, hence the variation recognised under this species by various workers is considerable. Due to paucity of specimens I have not been able to make any study of the range of variations. According to the diagnosis given by Goutscharov and Borissova (1946), the specimens cited above fall under *A. lepsensis* Bunge. However, I have preferred to retain *A. frigidus* (L) A. Gray, because the identity of *A. lepsensis* Bunge is doubtful. This point can only be clarified after a critical study of the group.

45. **Astragalus (Hemiphragmium) oxyodon** *Baker* in Hook f. Fl. Brit. Ind. 2: 125.1876.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 125.1876. As Baker has not given the description of the mature fruits, it has been drawn as follows:

Pod stipitate; stipe±.3 cm. long; pod±.6-.7cm long.±.3-4cm. broad, elliptical, acute, uniformly pilose, hairs white, occasionally a few black hairs are also present; unilocular, 4-6 seeded.

Seed±.2-.3cm. long, ±.1-.2cm. broad, reniform, glabrous, Chocolate brown in colour.

Holotype: West Tibet, Falconer (K).

Synonomy: Nil.

Figure reference:

Kashmir: Beyond Burzil Pass, 1852, Winterbottom (K).

Punjab: Lahul, Jaeschke 40-2nd. Collection (K); Upper Chanab Waterfall, Daiwas, 10,000′, Baden-Powell 98/9 (K).

Distribution: Kashmir; *India*, N. Punjab.

Flowering Period: August.

46. **Astragalus (Hemiphragmium) maddenianus** *Benth. ex Baker* in Hook. f. Fl. Brit. Ind. 2: 127.1876.

Description: Baker in Hook, f. Fl. Brit. Ind. 2: 127.1876.

Lectotype: Badrinath, 10—11,000′, Edgeworth (K); *Syntype:* Nainital, Madden (K).

Synonomy: Nil.

Figure Reference: Nil.

Representative Specimen:

Kumaun and Garhwal: Chur, 11,000′, Edgeworth 76 (K); Tehri Garhwal, Rhudughera, 10—11,000′, Duthie 989 (K); (E); (G); Ralam Valley, 10—11,000′, Duthie 2817 (K); Kumaun, Strachey and Winterbottom 5 (K).

Kashmir: Uishausar, 12,000′, Pinfold 370 ex parte (BM); Gadsar, 12,000′, Pinfold 347 ex parte (BM).

N.W.F. Province: Kagan, Bhimbal, Duthie 21240 (K); N. W. India, J. L. Stewart (E).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India,* Kumaun, Tehri Garhwal.

Flowering Period: July-August.

47. **Astragalus himalayanus** *Klotzsh* in Klotzsch and Garcke, Bot. Ergebn. Reise Waldemar.: 160.1862.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 126.1876.

Holotype: Himalaya, Hoffmeister (B-not seen).

Synonym:

1. *Astragalus carinalis* Benth. ex Bunge. Astrag. 1-23-1868; 2: 28.1869.
2. *Phaca longicaulis* Benth. ex Bunge, Astrag. 2: 28.1869, pro. syn.
3. *Phaca cachemerica* Benth. ex Baker in Hook. f., Fl. Brit. Ind. 2: 126. 1876, pro. syn.

Figure Reference: Klotzsh and Garcke, Bot, Ergebn. Reise Waldemar.: t. 4.1862.

Representative Specimens:

N.W.F. Province: Hazara, Duthie 19348 (K); Richmori, Saran nanfe, Hazara, 22: 8.1899. Duthie (K); Hazara Dist., Ch. Shaukat Ali (RAW).

Kashmir: Baltal, 9,000′, Thomson (K); Villanmarg, Gulmarg, 9—11,000′, 9-7-1872 Duthie (K); Kishenganga valley, near Gurais, 8—9,000′, Duthie 12592 (K); Tragbol, 9,000′, R. R. Stewart 4574 (K); Ind. Or., Jacquemont 1431 (K); Sunamarg Clarke 27190A (K); 27190B (BM); 30863A (K); Badrawar, 8,000′, Clarke 31482A (K); Kilammarg, 10,000′, Aitchison 23 (K); Zoji La, 10—11,000′, Duthie 13663 (K); Sinthan La, R. R. Stewart 3142 (K); Above Pahlgam, 10,000′-11,000′, R. R. Stewart 21818 (K); Above Tragbol, 10,500′, Osmaston 21 (K). Astan marg, 12—13,000′, Drummond 14275 (K); Pahlgam, 7,000′, Coventry 1360 (K); Near Islamabad, Fuller 893 (K); Goorai, 8,700′, Clarke 29324 (K); Soonamarg, Rich 1174 (K); Sheshanag, 12,500′, Drummond 14178 (K); Rajparyan sanaturary, Upper Bringhi, 9,500′, Ludlow and Sherriff 9337 (BM); Godsar, 12,000′, Pinfold 347 (BM); Baltal to Natayan, Sept., 80

A. P. Young, (BM); Musjid Valley, 12—13,000′, Duthie 13202 (BM); Shishanag to Pangtaran, Sept. '80, A. P. Young, (BM); Poonch 17-9-1952, A. Rashid Khan (RAW); Burzil Chawki to Deosai plain, R. R. Stewart, 19994 (RAW); Pashwari, 8—9,000′, A. Meebold 1377 (G); Pung, Sangu, W. Keolz 6035 (G).

Punjab: Mangsu pass, Baspa Valley, 13,400′, Simla Hill states, Sherriff 7448 (BM); Pangi, Stoliczka (K); Gopna 10,000′, Bor 12689 (K); Billing Lumpa, Lahul, Bor 16586 (K); (E). Kyelong, 10,000′, Bor 14716 (K). Above Kyelang Drummond 23499 (K); 23500 (K); Sach pass, Pangi side, 10,000′, R. R. Stewart 2613 (K); Kunawar, 8,000′, 1852, Thomson (K); Tasol Mount. above Pangi, Drummond 21885, (K); (E); Chamba State, Bindraban to Donai (Pangi) 9,000′, Lace 1298 (E); Bashahr state, right bank of Baspa, Lace 442 (E); Kangra, Lahul, Sissu, 10,000′, W. Koelz 5133 (G).

Kumaun and Garhwal: Below Saba, 9,000′, Strachey and Winterbottom 4 (K); Garhwal, Ex. Herb. Falconer (K); Kumaun, moraine in Malapa gadh, Darma, 11—12,000′, Duthie 5465 (BM); Nila valley, 11—12,000′, Duthie 982 (BM).

Distribution: W. Pakistan: N.W.F. Province; *Kashmir*; *India*, N. Punjab, Kumaun, 5,000′—13,000′ (Blatter, 1927).

Flowering Period: June-September.

48. **Astragalus tenuicaulis** *Benth.* ex. *Bunge*, Astrag. 1.23.1868; 2: 28.1869.

Description: Baker in Hook. f., Fl. Brit. Ind. 2: 126.1876.

Lectotype: Sikkim, 7—9,000′, J. D. Hooker (K); (BM);

Synonym:

1. *Astragalus inconspicuus* Baker in Hook. f., Fl. Brit. Ind. 2: 126.1876.

The type of this species is a plant collected by Strachey and Winterbottom at the bank of river Ralam, 9,000′, in Kumaun. This specimen was also cited by Bunge for his *A. tenuicaulis*. It is a poor specimen with no fruits and a few flowers, and it is not possible to distinguish it from *A. tenuicaulis* Bunge.

Figure reference: Nil.

Representative Specimens:

Kumaun: Ralam river, 9,000′, 1852, Strachey and Winterbottom (type of *A. inconspicuus* Baker) (K) Dakwam, 11,500′, 20-9-85 J. R. Reid (E).

Distribution: India, Kumaun, *Sikkim*; 7—9,000′.

Flowering Period: July-August.

49. **Astragalus strictus** *Grah.* ex. *Benth.* in Royle, Illust. Bot. Himal. Mount.: 198,1835.

Description: Baker in Hook. f., Fl. Brit. Ind. 2: 124.1876.
Holotype: Mountains of Sylhet, Wall. 5924 (K-W).
Synonomy:

1. *Astragalus mutabilis* Jacq. ex Baker in Hook. f. Fl. Br. Ind. 2: 125.1876, pro. syn.

Figure reference: Nil.
Representative Specimens:

Kashmir: Nubra valley, 11,000′, 4-8-1848, Thomson (K); Leh, 12,000′, 1852, Thomson (K) Ladakh and Nubra, 1851, Thompson (K); Nubra valley, 10,500′, R. C. Clifford 37b (K); Indus valley, ladakh, 11,000′, 30-9-1847, Thomson (K); Ladakh, Tsakzhun Tso, 15,000′, W. Koelz 2380 (K) Rupshu, Unti, 15,500′, W. Koelz 2222 (K); Rupshu, Tso Morari Korzak, 15,000′, W. Koelz 2204 (K); Ladakh, Kharu, Shyok valley, 9,800′, Ludlow 533 (BM); Tibet. occ. 11—16.000′, Thomson (G); Ladakh, Pitug, W. Koelz 6330 (G); Ladakh, Gya, W. Koelz 6414 (G); Ladakh, Kikir, W. Koelz 6280 (G).

Punjab: Piti, 12,000′, Thomson (K); Changar, Piti, 12,000′ 27-8-1847. Thomson (K); Spiti, Takenak to Giam, Schlagintweit 2484 (BM); Kouling, Lahul, Bor 15190 (K);

Kumaun: Nipchang valley, 13—14,000′, Duthie 2808 (K);
Distribution: Kashmir; *India*; N. Punjab, Kumaun; *Nepal*; *Sikkim*; *Tibet*; *E. Pakistan*, Sylhet, 11,000′—16,000′.
Flowering Period: April-September.

50. **Astragalus (Hemiphragmium) confertus** *Benth.* ex *Bunge*, Astrag. 1: 23. 1868; 2: 27.1869.

Boissier (1872) has merged this species with *A. hippocrepidis* Benth. ex. Bunge. Baker (1876) has rightly maintained it as a distinct species. The two species differ in the character of the stigma, fruit, flower, inflorescence and the general habit. In fact the difference is so pronounced that Bunge (1868, 1869) placed them in two different subgenera.
Description: Baker in Hook f. Fl. Brit. Ind. 2: 123.1876.
Lectotype: West Himalayas, 15,000′—17,000′, Strachey 15 (K).
Synonomy: Nil.
Figure reference: Nil.
Representative Specimens:

Kashmir: Tibet Occ. 15—17,000′, Thomson (K); Parang valley, 15,000′, 18-9-1847. Thomson (K); Rupshu, Khyung Tso, 16,500′, W. Koelz 2251 (K).

Punjab: Biling Lumpa, 13,000′, Bor 12685 (K).
Distribution: Kashmir; *India*, N. Punjab; *E. Turkestan*, *Tibet*, 13,000′—18,000′.
Flowering Period: July-September.

51. **Astragalus (Lithophilus) munroi** *Benth.* ex. Bunge, Astrag. 1 : 30.1868. 2: 35.1869.

Description: Bunge, Astrag. 2: 35.1869.

Holotype: Ladakh, Pass east of Leh, 13,000′, Strachey (K).

Synonomy: Nil.

Figure reference: Nil.

Representative Specimens:

Punjab: Kulu, Lahul, Yotse Glacier, 14,000′, Drummond 23493 (K); (E); (G); Patseo, 13,000′, Lahul, Bor 13162 (K); (E).

Kashmir: Piti, Strachey (K); Ladakh, 11,000′, July and August, Collector unknown. (K); Lotsum, Baltistan, 10,000′, Osmaston 135 (K); Mulbeh, Treaty Road, Ladakh, 10,000′, Ludlow and Sherriff 8362 (BM); (E).

Distribution: Kashmir, India, N. Punjab; Tibet; Chinese Turkestan.

Flowering Period: June-September.

52. **Astragalus Kashmirensis** *Bunge*, Astrag. 1. 30. 1868. 2.34.1869.

Bunge (1868) in the first part of his monograph of the genus *Astragalus* has described *A. kashmirensis* Bunge for the first time. However, in the second part of his monograph, which appeared in 1869, he has spelt the specific epithet as '*caschmirensis*'. According to rule 73 (Int. Code Bot. Nom. 1956). "The original spelling of a name or epithet must be retained, except that typographic or orthographic error should be corrected". The second spelling of the specific epithet, i.e. '*caschmirensis*' is not an orthographic correction, hence the original spelling of the specific epithet, i.e. *kashmirensis* should be retained. It will not be out of place to remark that Baker (1876) adopted a third orthographic variant, i.e. *cashmirensis*, which likewise has no valid standing. I am indebted to Mr. Bullock for his advice in this connection.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 127.1876.

Lectotype: Kashmir, ex. Herb. Falconer 420 (K).

Syntype: Kashmir, Jaeq. 778 (K); (P).

Synonomy: Nil.

Figure Reference: Nil.

Representative Specimens:

Kashmir: Pir Panjal, Banihal Pass, 9,000′, R. R. Stewart 12186 (K); (G); Kashmir, Jacqemont 1552 (K); Kashmir, Ex Herb. Falconer (K).

Distribution: Kashmir.

Flowering Period: July.

53. **Astragalus (Hypoglottis) tibetanus** *Benth.* ex *Bunge*, Astrag. 1. 52. 1868; 2. 85. 1869.

Description: Baker in Hook, f. Fl. Brit. Ind. 2: 124.1876.

Lectotype: Tibet Occ., 9—14,000′, Thomson (K); (P).

Synonomy:

1. *Astragalus chadjanensis* Franch. in Bull. Mus. Hist. Nat. Paris, 2: 344.1896.

2. *A. olufsenii* Freyn in Bull. Herb. Boissier, 4: 450.1904.

The type of *A. olufsenii* Freyn could not be seen. It has been listed here following Gontscharov and Borissova (1946).

Figure reference: Nil.

Representative Specimens:

Kashmir: Ravine N. of Shayuk river, Ladakh, 13,000′, Thomson (K); Indus valley W. of Leh. 11,000′, Nubra, 11,000′, 1852, Thomson (K); Gilgit Exped. N. of Hindukush, 9,000′, Giles 213 (K); Ladakh, 10,000′, Ludlow 395 (BM); near Sinthan Pass, 11,500′, Ludlow 207 (BM); Goorai, 8,000′, Clarke 29345 (BM); Hopar Glacier, Magar, Gilgit, 9,000′, R. R. Stewart 26495 (RAW); Zaskar, Kargia, 13,500′, W. Koelz 5568 (G); Tibet. Occ. 9—14,000′, Thomson (E); (G);

Distribution; *Afghanistan*; *Kashmir*; *Russia*, Irtysh, Altai, Dzungaro-Tharbagatai, Pamir Alai, Tien Shan (Gontscharov and Borissova, 1946).

Flowering Period: July-September.

54. **Astragalus (Chlorostachys) emodi** *Steud.* ex *Baker* in Hook. f. Fl. Brit. Ind. 2: 130.1876.

Description: Baker l.c. 1876. This description should be modified as follows:

Pod pubescent when young, glabrous when old.

Lectotype: Kumaun toward Emod, Wall 5930 (W-K); Baker (1876) cites the following three specimens: (*i*) Wall, 5930 (*ii*) Kumaun, Blinkworth, (*iii*) Kumaun, Strachey and Winterbottom. I have not seen Blinkworth's specimen, which is untraceable at Kew. There are three sheets of wall. 5930. Of these only one (ex Herb. Benth.) has a few flowers in an attached envelope. It is most probable that the description of the flowers a given by Baker is based on this material.

Baker (1876) describes the fruit as glabrous. In Wall. 5930 (ex Herb. Benth.) the fruit as well as the ovary is glabrous. However, in Kumaun, Strachey and Winter-bottom the pods are pilose when young, but become glabrous at maturity. It has not been possible to reconcile the presence of totally glabrous ovary in the envelope with Wall. 5930 (ex Herb. Benth). Therefore it seems unlikely that the flowers in the envelope belong to this species. However, this point can only be settled when more material is available.

Synonomy:

1. *Astragalus podocarpus* Grah. in Wall. Cat. 5930, non C. A. Meyer (1831), nom. nud.

Figure reference: Nil.

Representative Specimens:

Kumaun: Along Gori river, 10,500′, Strachey and Winterbottom 4 (K); Byans, Palangarh, 10,000′, 21-7-1886, J. R. Reid (E).

Distribution: Endemic in Kumaun.

55. **Astragalus (Chlorostachys) maxwellii** *Royle* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 198.1835; Ali in Kew Bull. 1958 (2): 308.1958.

Description: The description of *A. ciliolatus* as given by Baker in Hook. f. Fl. Brit. Ind. 2: 129.1876.

Synonomy:

1. *Astragalus ciliolatus* Benth. ex Bunge, Astrag. 1: 27.1868; 2: 33.1869.

Figure Reference: Nil.

Kashmir: Kashmir, Ex. Herb. Falconer (K); Battal, 9,000′, 28-9-1848, Thomson (K); Kishtwar, 8,000′, 14-6-1848, Thomson (K); Tilail, 13,000′, Clarke 30669 (K); Liddar, 10,000′, Coventry 576 (K); Sonamarg, 10,000′, 5-8-1921, R. R. Stewart (K); Sonamarg, 9,800′, R. R. Stewart 6342 (K); Kashmir, A. P. Young (BM); Minimarg, 9,000′—10,000′, R. R. and I. D. Stewart 19156 (RAW).

Distribution: Kashmir, 6,000′—13,000′.

Flowering Period: June-July.

Subgenus Caprinus Bunge.

Artificial Key to the species:

1. Leaf imparipinnate	...	2
Leaf paripinnate	...	24
2. Vexillum pilose outside	...	3
Vexillum glabrous	...	5
3. Stipules longer than the internodes (aerial stem almost absent)	...	4
Stipules shorter than the internodes	...	(56) *A. orbiculatus*
4. Vexillum > 3 cm. long.	...	(57) *A. fernandezianus*
Vexillum ⩽ 2 cm. long	...	(58) *A. chitralensis*
5. Calyx totally glabrous	...	(59) *A. concinus*
Calyx pilose	...	6
6. Leaflets verticillate	...	(60) *A. toppinianus*
Leaflets not verticillate	...	7
7. Pod stipitate, stipe more than .1 cm. long	...	8
Pod sessile or stipe less than .1 cm. long.	...	11

8. Leaflets orbiculate ... (61) *A. flexus*
Leaflets not orbiculate ... 9
9. Pod ±.6 cm. or less broad ... 10
Pod 1—1.2 cm. broad ... (62) *A. auganus*
10. Inflorescence sessile in the axil of the leaf, vexillum panduriform ... (63) *A. rhizocephalus*
Inflorescence pedunculate, vexillum not panduriform (64) *A. candolleanus*
11. Leaflets less than .3 cm. long ... (65) *A. minuto-foliolatus*
Leaflets more than .3 cm. long ... 12
12. Pod globose, leaflets acute ... (66) *A. gompholobium*
Pod not globose, leaflets not acute ... 13
13. Leaflets orbicular to suborbicular ... (67) *A. pyrrhotrichus*
Leaflets not as above ... 14
14. Internodes longer than the stipules ... 15
Internodes shorter than the stipules ... 17
15. Stipules ±.6 cm. or less long, tip acute ... (68) *A. polybotrys*
Stipules rarely .7 cm., generally 1—1.5 cm. long, tip acuminate ... 16
16. Fruit glabrous ... (69) *A. retamocarpus*
Fruit pilose ... (70) *A. malacophyllus*
17. Ovary and pod glabrous ... (71) *A. webbianus*
Ovary and pod pilose ... 18
18. Peduncle 6—31.5 cm. long ... (72) *A. flemingii*
Peduncle 5 or less than 5 cm. long ... 19
19. Lower calyx teeth less than .5 cm. (.3, ±.4 cm.) long ... 21
Lower calyx teeth .5 cm. or more long ... 20
20. Lower calyx teeth .5 cm., seeds c.8 per fruit ... (73) *A. staintonianus*
Lower calyx teeth ±.3—.4 cm., seeds>10 per fruit... (74) *A. rhizanthus*
21. Leaflets 15—25, rarely 31 ... 22
Leaflets 41 or more ... 23
22. Rachis stout, erect ... (75) *A. zanskarensis*
Rachis not stout, curved ... (76) *A. pindreensis*
23. The distance between the two successive pairs of leaflets more than .3 cm. ... (77) *A. nicharensis*
The distance between the two successive pairs of leaflets .3 cm. or less ... (78) *A. purpurascens*
24. Fruit unilocular ... 25
Fruit bilocular ... 26

25. Calx teeth±.2 cm. long ... (79) *A. aegacanthoides*
Calyx teeth±.6 cm. long ... (80) *A. diopogon*
26. Vexillum pilose externally ... (81) *A. genistoides*
Vexillum glabrous ... 27
27. Leaflets 9 pairs or less ... 28
Leaflets 10 pairs or more ... 36
28. Internodes longer than the stipules ... 29
Internodes shorter than the stipules ... 33
29. Stipules connate, sheathing the stem,leaving an annular scar ... 30
Stipules not connate, not leaving an annular scar 31
30. Young twigs, rachides and leaflets beneath subglabrous (82-a) *A. psilocentros* var. *psilocentros*
Young twigs, rachides and leaflets beneath clothed with long loose hairs ... (82-b) *A. psilocentros* var. *pilosus*
31. Young shoots glabrous to subglabrous, vexillum panduriform ... (83) *A. grahamianus*
Young shoots densely pilose, vexillum not panduriform 32
32. Stipules erect, calyx cup more than 3 times the upper calyx teeth ... (84) *A. multiceps*
Stipules spreading, calyx cup less than 3 times the upper calyx teeth ... (85) *A. bicuspis*
33. Stipules united throughout with the petiole, the tip pointing outwards ... (86) *A. hemsleyi*
Stipules free in the upper part, the tip pointing upwards 34
34. Vexillum less than 2.5 cm. long ... 35
Vexillum more than 2.5 cm. (2.7—3.0) long ... (87) *A. psilacanthus*
35. Fruiting calyx longitudinally striate ... (88) *A. pseudopsilacanthus*
Fruiting calyx not longitudinally striated ... (89) *A. hostilis*
36. Vexillum 1.8 cm. long ... (90) *A. polycanthus*
Vexillum more than 2.0 cm. long ... 37
37. Rachis 3—5 cm. long ... (87) *A. psilacanthus*
Rachis±7—17 cm. long ... (91) *A. oplites*

56. **Astragalus (Orionotus) orbiculatus** *Ledebour*, Fl. Alt. 3: 311.1831; Ic. Pl. Fl. Ross. 3: 26, t. 290.1831; Ali in Kew Bull. 1958 (2): 309.1958.

Description: Boiss. Fl. Or. 2: 278.1872.
Holotype: In the desert of Soongoro-Kirghis, Ledebour (LE-not seen).
Synonymy: Nil.
Figure Reference: Ledebour, Ic. Pl. Fl. Ross. 3: t. 290.1831.
Representative Specimens:

Kashmir: Gilgit Exped., Urgan Wakham, Giles 136 (K); N. of Hindukush, Giles (E).

N.W.F. Province: Chanadda, near Kabul river, 1,000′, H. A. Deane 68 (K).
Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *Russia*, Irtysh, Aralo-Caspia, Balkash, Amu Darya foothills, Syr Darya foothills; *Afghanistan*.
Flowering Period: April-May.

57. **Astragalus (Myobroma) fernandezianus** *Blatter* in J. Bomb. Nat. Hist. Soc. 36: 480.1933.
Description: l. c.
Holotype: S. Waziristan, Ramzak, 6,800′, Fernandez 3278 (BLAT-untraceable).

Blatter (1933) has also referred the following co-types: S. Waziristan, Ramzak, 6,800′, Fernandez 3113, 3174, 3279; N. Waziristan, Alexandra Picket, above Razani, 8,000′, Blatter and Fernandez 1261. Unfortunately all these specimens are presently untraceable there.
Synonymy: Nil.
Figure Reference: Nil.
Representative Specimens:

I have not seen any specimens belonging to this taxon, my conclusions are based on the description given by Blatter (1933).

Flowering Period: May (Blatter, 1933).

58. **Astragalus (Erionotus) chitralensis** *Ali* in Kew Bull. 1958 (2): 308.1958.
Description: Perennial herb. *Root* not seen. Stem much reduced; aerial stem almost absent. *Leaf* imparipinnate, stipulate; stipule .7—1.3 cm. long, adnate, tip free (±3—.6 cm.), entire, acute, pilose; hairs yellowish, spreading. Rachis ±8—14 cm. long, grooved adaxially, pilose, hairs yellowish, spreading. Leaflets 25—49, petiolate; petiolule < .1 cm., lamina ±.4—.7 cm. long, ±.2—.5 cm. broad, elliptical, obtuse, pilose uniformly below, very profusely above; partially conduplicate weven when old. *Inflorescence* 5-flowered, peduncled raceme. Peduncle +.3—.5 cm. *Flower* bracteate, bract ±.5—.6 cm. long, +.1 cm. broad, acuminate, pilose. Pedicel .1- < .3 cm. long, pilose. Calyx 1.2—1.6 cm. long, pilose, hairs white, teeth ±.7—1.0 cm. long. *Corolla* orange yellow (in dry condition). Vexillum 1.4—1.9 cm. long, ±.4—.5 cm. broad, oblongo-rhomboidial, tip retuse. Wing 1.4—1.6 cm., claw ±.6—.7 cm., auricle ±.1—.2 cm. long. Keel 1.0—1.1 cm. long, claw +.6—.7 cm.

Stamens diadelphous, 9+1, filaments ±1.0—1.2 cm. long. Ovary stipitate, stipe±.1—.2 cm., ovary±.4—.5 cm., densely hirsute, style glabrous,±.4—.5 cm., bent at right angles at about .2—.3 cm. from the stigma. Stigma capitate. *Fruit* stipitate, stipe ±.1 cm. long, pod±1.0 cm. long,±.4—.5 cm. broad, obovate, tip acute curved; unilocular, dehiscent along both the sutures; profusely hairy, hairs white, spreading. *Seed* reniform, chestnut brown; mature seeds not seen.

Holotype: Chitral, Birmoghlasht, 7,000'-8,000', 2-8-1954, M. A. Siddiqui and A. Rahman 26881 (K); (RAW).

Paratype: Chitral, Toppin 269 (K).

Flowering Period: May-June.

59. **Astragalus (Myobroma) concinnus** *Benth.* ex *Bunge*, Astrag. 1: 38.1868; 2: 50.1869.

Description: Boiss. Fl. Or. 2 : 285.1872.

Holotype: Baluchistan, Kopata, Stocks 1169 (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Kopata, Stocks 874 (G); 874 ex parte (K)'.

Distribution: W. Pakistan, Baluchistan; *Afghanistan,* Kabul (Rechinger f., 1957).

Flowering Period: I have not seen any flowering specimen bearing date of collection.

60. **Astragalus (Myobroma) toppininus** *Ali* in Kew Bull. 1958 (2): 309.1958.

Description: *Root* woody. *Stem* reduced, internodes covered with persistent stipules and leafy bases. *Leaf* stipulate, stipules lateral, adnate to the base of the rachis,±.6—1.0 cm., long, .3—.4 cm. broad, membraneous pilose, margin entire, tip obtuse to acute. Rachis 5—13 cm. long, uniformly pilose, petiole 2.3—10 cm. Leaflets verticillate, 4—12 whorls per leaf, each whorl consisting of 3—6 leaflets; leaflets petiolate, petiolule < .1 cm. lamina±.5—1.2 cm. long, ± > .1—.2 cm. broad, remains permanently conduplicate; linear to linear-obovate, margin entire, tip acute; uniformly pilose on both the sides, hairs white. *Inflorescence* scorpoid cyme. Peduncle .3—2.0 cm., pilose. *Flower* bracteate, bract±.5—.7 cm. long, ±.1 cm. broad, lanceolate, margin entire, tip acute, tip acute, hairs white, spreading; pedicel±.3—.6 cm. long, glabrous or sparsely hairy. *Calyx* ±1.5 cm. long, teeth ± > .3—.4 cm. long, minutely hairy, cup oblique, ±1.0 cm. long above, +1.1—1.2 cm. long beow, minutely hairy near the teeth, glabrous towards the base. *Corolla* yellow-yellowish orange (in dry condition). Vexillum ±2.8 cm. long, ±.9 cm. broad, panduriform, tip emarginate. Wing ±2.5—2.6 cm. long, ±.2—.3 cm. broad, claw±1.6 cm.,

auricle±.1 cm. Keel ±2.1—2.2 cm. long,±.3—.4 cm.broad, claw±1.5—1.6 cm. long. *Stamens* diadelphous, 9+1, filaments ±2.1—2.2 cm. *Ovary* stipitate, stipe±.2 cm. long, ovary±.6—.7 cm. long,±.1 cm. broad, pilose. Style ±1.3—1.4 cm. long, minutely hairy below, glabrous above, bent at right angles to the axis of the ovary at ±.2 cm. from the stigma. Stigma globular. *Fruit* not seen.

Holotype: W. Pakistan, Chitral, Shajanali, 11,000′, May, 1908, Topping 341 (K).

Synonymy: Nil.

Figure Reference: Ali in Kew Bull. 1958 (2): t. 2.1958.

Representative Specimens:

N.W.F. Province: Chitral, 4,000′, 3-6-'95, S. A. Harriss 16034 (K).

Distribution: Endemic to Chitral.

61. **Astragalus (Myobroma) flexus** *Fisch.* in Bull. Phys.-Math. Acad. Petersb. 3: 307.1844.

Description: Boiss. Fl. Or. 2: 283.1872.

Holotype: In Scythia, field of Kirghis, dry place, Pander (LE-not seen).

Synonym:

1. *Astragalus pentapetaloides* Bunge in Mem. Sav. Etr. Petersb. 7: 274.1851.
2. *A. stenanthus* Freyn in Bull. Herb. Boissier, ser. 2, 4: 761.1904, non Bunge (1880).
3. *A. aquae-rubrae* B. Fedtsch., in Beih. Bot. Centralbl. 23 (3): 352.1908.

The types of *A. pentapetaloides* Bunge and *A. aquae-rubrae* B. Fedtsch. are in Leningrad and could not be seen. In listing these species as synonyms, I have followed Gontscharov and Boorissova (1946).

Figure Reference: Komarov et al. Fl. U.R.S.S. 12: t. 14. f. 1.1946.

Representative Specimens:

I have not seen any specimen of this species from Baluchistan, though it has been reported from there by Bunge (1869). Boissier (1872) and more recently by Parsa (1948). Bunge quotes "Stocks 939, ex p.", Boissier has also referred to Stocks' specimen. I have observed five sheets bearing the label "Stocks 939" in Kew Herbarium, and none of these belong to *A. flexus Fisch.*

Distribution: Russia, Aralo-Caspia, Balkash, Kyzyl Kum, Kara Kum, Syr Darya foothills. Pamir Alai; *Persia*, Kerman; *W. Pakistan*, Baluchistan (Bunge, 1869; Boissier, 1872; Parsa, 1948).

Flowering Period: April (in Persia).

62. **Astragalus (Myobroma) auganus** *Bunge*, Astrag. 1: 36.1868; 2: 46.1869.

Description: Bunge, Astrag. 2: 46.1869.

Holotype: To Kuchlak, Griffith, 1531 (K).

Synonymy: Nil.

Figure reference: Nil.

Representative Specimens:

Baluchistan: Mungrehur, Mangochur, Stocks 939 (K). Peshin, 5,1000′ 29-3-1889. Lace (K), Peshin 5,200′, Lace 3585 (E); 3989 (E).

Distribution: W. Pakistan, Baluchistan.

Griffith 1531 bears the label "To Kuchlak, Afghanistan". Kuchlak is situated in Baluchistan, near Quetta, and not in Afghanistan. This fact is further confirmed by the perusal of Griffith's Travels (Griffith, 1847).

Flowering Period: March.

63. **Astragalus (Myobroma) rhizocephalus** *Baker* ex *Aitchison* in J. Linn. Soc. (Bot.) 18: 46.1880.

Description: Aitchison (1880) and Boissier (1888) have not given the description of the fruit and that of the flower is inadequate, hence a fresh description of the flower and fruit is supplemented below:

Flower: Pedicellate, pedicel ±.1 cm., pilose. *Calyx* 1.1—1.3 cm. densely pilose, hairs white, spreading; quinque-denticulate, teeth subequal, ±.5—.7 cm. long, linear. *Corolla* basal portion white, upper yellow; vexillum ±1.6—2.2 cm. long, ±.4—.9 cm. broad, panduriform, tip retuse-emarginate. Wing 1.5—2 cm. long, ±.2—.4 cm. broad, tip obliquely emarginate, auricle ±.1 cm.; claw ±.8—1.0 cm. Keel 1.2—1.4 cm. long, ±.2—.3 cm. broad, claw ±.7—.8 cm. *Androecium* diadalphous, 9+1, filaments ±1.1—1.3 cm. long. *Gynaecium,* ovary stipitate, stipe ±.1 cm., ovary ±.6 cm. long, profusely hirsute, style ±.3—.4 cm. long, hairy below, glabrous in the upper portion. Stigma capitate. *Fruit* stipitate, stipe ±.1—.2 cm. long. Fruit±1.1 cm. long, .6 cm. broad, ovate, curved a little on one side, tip acute, profusely hairy, hairs pale spreading; many seeded. *Seed* reniform, ±.3—.4 cm. long, ±.3 cm. broad, glabrous, pitted, fuscous yellow, with black spots.

Lectotype: Kurram valley, Sargul to Biankhel, 5-6-'79 Aitchison 510 (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimen:

N.W.F. Province: Chitral, Qazilbash 10400 (K).

Distribution: W. Pakistan, Chitral, *Afghanistan.*

Flowering Period: June.

64. **Astragalus (Myobroma) candolleanus** *Royle* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

The Identity *of* Astragalus candolleanus *Royle ex Benth.*

This species is based on a specimen collected by Royle from 'Rogee in Kunawar'. Royle's Herbarium has been untraceable till recently (Stansfield,

1953). The specimen, supposed to be the holotype of this species was borrowed from Liverpool. This specimen bears the label '*A. candolleanus*, Rogee in Kunawar' but when it is compared with the description it becomes evident that Bentham did not base his description on this specimen. Bentham has described "foliolis 21—31", whereas in this specimen as many as 47 leaflets are present. One has to be extremely cautious in accepting the specimens in Royle's Herbarium as the types, since at the time of their rediscovery the specimens were in a very bad condition and it is not unlikely that a few labels or specimens may have been misplaced, for the specimens are not mounted.

This specimen agrees with *A. malacophyllus* Benth. ex Bunge. Thus as pointed out earlier this specimen should not be accepted as the type of *A. candolleanus*. Royle ex Benth.

In Kew Herbarium there are two specimens collected by Royle. One of these specimen comes from '*Herb. Benrhamianum*' and was collected in 'Kunawar' the other specimen orginally comes from 'Herb. Hookerinum' and bears no exact locality but only 'N. W. India'. Thus it seems reasonable to accept 'Kunawar,; Royle, Ex Her. Benth. (K)' as the type of this species.

Description: Parker, For. Fl. Punj.; 139.1924.

Type: Kunawar, Royle (K).

Synonymy:

1. *Astragalus anomalus* Bunge, Astrag. 1: 35.1868; 2: 62.1869.
2. *A. royleanus* Bunge, Astrag. 1: 30.1868; 2: 34.1869.

Figure Reference: Nil.

Representative Specimens:

Kashmir: Tragbol, 10,000′, R. R. Stewart 4739 (K); 4573 (K). Kamri Pass, 11—13,000′, Gilgit Exped. Giles 708 (K). Gurais, Kishenganga valley, 8,200′, Giles 49 (K). Below Gulmarg, 7,000′, Fuller 99 (K). Zojpal, 11,000′, Coventry 651 (K). Baltal, 9,500′, Thomson (K). Tilel, 11,000′, R. R. Stewart 4343 (K). Bangla, 9,000′, Clarke 29555A (K); 29555B (BM). Barzil, 11,300′, Clarke 29723 (K). Near Bhogtaur, Kishenganga valley, 7,500′, R. R. Stewart 17923 (RAW).

N.W.F. Province: Hazara, Kagan valley, Batta Kundi, 10,000′, Sept. 1910, Parker (K). Kalam, 8,000′, R. R. Stewart 24716 (RAW). Saiful Maluk, July, 1954. Ch. Shaukat Ali (RAW).

Distribution: Kashmir; *W. Pakistan*, N.W.F. Province.

Flowering Period: June-August.

65. **Astragalus (Myobroma) minuto-foliolatus** *Wendelbo* in Nytt Mag. Bot. 1: 43.1952.

Description: Wendelbo in Nytt Mag. Bot. 1: 43.1952. This description should be corrected as follows: Calyx 1.4—1.8 cm. long, teeth ±.2—.3 cm.

Wendelbo (1952) describes the calyx as '.....17 fere mm. longus, cuius dentes trianguli 6—8 mm. longi'. The length of the teeth as described by him does not agree with his diagram (Wendelbo, l. c.; t. 16.) according to which the teeth are ±4.7—5.3 mm. However in the isotype at Kew the teeth vary from .2—.3 cm.

Holotype: Chitral, Barum Gol, camp 2 by south Barum Glacier, c. 4500 m. alt, 3-7-1952 (0-not seen). *Isotype* (K); (BM).

Synonymy: Nil.

Figure Reference: Wendelbo, Nytt Mag, Bot. 1: t. 16.1952.

This figure of the calyx in this illustration is not correctly drawn.

Representative Specimens:

Kashmir: Lower Darosh lake, Badahhsheh, 12,000', Gilgit Exped., Giles 254 (K).

Baluchistan: Near Tooz, Khorrmultir (?), 2-3-1850. Stocks 40(K).

It has not been possible to trace the exact locality where Stocks collected this speciment. However, Stocks (1850) has described his tour of Baluchistan, where he states it to be confined between 28—30 N and 66—67 E.

Distribution: Kashmir; *W. Pakistan*, N.W.F. Province, Baluchistan.

Flowering Period: March-July.

66. **Astragalus (Myobroma) gompholobium** *Benth.* ex *Bunge*, Astrag. 1: 39. 1868; 2: 50.1869.

Description: Boissier, Fl. Or. 2: 284.1872.

Holotype: Baluchistan, Doobund, 1851, Stocks 965 (K).

Synonymy: Nil.

Figure Reference: Nil.

Distribution: Afghanistan: W. Pakistan, Baluchistan.

According to Burkill (1909) 'Duoband' is evidently the hill Doband or Sarband over the junction of Shirinab and Gurgina rivers, near Zard between Nushki and Kalat.

Flowering Period: April.

67. **Astragalus (Myobroma) pyrrhotrichus** *Boiss.* Diagn. Pl. Or. Nov. Ser. 1 (9): 73.1849.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 133.1876.

Holotype: Afghanistan, Griffith 1066, Ex Herb. Hooker (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Khyber Pass, H. H. Johnston 85 (K); (E). Bundai, Chitral, Relief Exped., S. A. Harriss 16024 (K). Hazara, 4,000', Drummond 20063 (K). Abottabad, 4,000', R. R. Stewart 14640 (RAW).

Punjab: Sunderchah, Dt. Gurdaspur, Drummond 891 (K). Kundi Hill, Black Mount. country, Drummond 21909 (K); (E); (G). Ghazi Kundi Hill, Drummond 21900 (K); (E); (G). Sirata jungle, Drummond 21908 (K). Attock, V. Eyre (K). Attock, Aitchison 1043 (K).

Distribution: Afghanistan; *W. Pakistan*, N.W.F. Province, Punjab; *India*, E. Punjab.

Flowering Period: March-September.

68. **Astragalus (Erionotus) polybotrys** *Boiss.* Diagn. Pl. Or. Nov. Ser. 1 (9): 64.1849.

Description: Boiss. Fl. Or. 2: 278.1872.

Holotype: Afghanistan, Griffith 1075(K); (G).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Quetta, Lace 3551 (E). Kheishan, 1851, Stocks 1099 (K); (G).

Distribution: Afghanistan; *W. Pakistan*, Baluchistan.

Flowering Period: April.

69. **Astragalus (Cartillagenella) retamocarpus** *Boiss. & Hohen* in Boiss. Diagn. Pl. Or. Nov. Ser. 1 (9); 68.1949; Ali in Kew Bull. 1955 (2): 311.1958.

Description: Boiss. Fl. Or. 2: 277.1872.

Holotype: 'At the foot of the mountain Demawend above Ask, Kotschy 379 (K); (G).

Synonymy:

1. *Astragalus askabadensis* O. Kuntze, Acta Horti petropol. 10: 182.1887.

I have not been able to verify this synonym. I have listed it following Gontscharov and Borissova (1946).

Figure Reference: Komarov et al., Fl. U.R.S.S. 12: t. 7, f. 2.1946.

Representative Specimens:

N.W.F. Province: Swat, April, 1949, Lahore Students 101 (RAW).

Distribution: W. Pakistan, Swat; *Russia*, Mountain Turkmenia, Pamir Alai; *Persia* (Parsa 1948).

Flowering Period: February-March.

70. **Astragalus (Myobroma) malacopyllus** *Benth.* ex *Bunge*, Astrag. 1: 36.1868; 2: 61.1869.

Parker (1924) has regarded *Astragalus malacophyllus* Benth. ex Bunge and *A. rhizanthus* Royle ex Benth. to be conspecific. Previous workers (Bunge, 1868, 1869; Baker 1876) have maintained them as distinct species. I have studied extensive material of these taxa including the type of one and the

authentic material of the other taxon and I am fully convinced that the two taxa are specifically distinct. The main differences between the two are as follows:

A. malacophyllus	*A. rhizanthus*
1. Internodes longer than the stipules, aerial stem well developed.	1. Internodes shorter than the stipules, aerial stem almost absent.
2. Peduncle .8—5 cm. long.	2. Peduncle 0—±2 cm. long.

Astragalus malacophyllus Benth. ex Bunge.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 133.1876.

Type: Bunge (1869) has cited 'In jugo Himalyensi boreali-occidentali, 8—10,000', Thomson, Falconer'. These specimens are presumably in Leningrad Herbarium. One of these specimens should be designated as lectotype. Since I have not been able to see any of these specimens, my observations are based entirely on those in the Kew Herbarium, namely three specimens collected by Thomson from the locality mentioned above.

Synonymy:

1. *A. multiceps* Wall, 5937 (nom. nud.), nec Benth. (1835).

Figure Reference: Nil.

Representative Specimens:

Kashmir: Chanab valley, 10,000', 1852, Thomson (K). Kashmir, Ex. Herb. Falconer 422 (K). Chenab valley, 8,000', B. H. Baden-Powell 101 (K). Tragbol, 9,500', R. R. Stewart 4221 (K). Gures pass, north of Kashmir, Winterbottom 520 (K). Kishtwar, 8—11,000', Thomson (K).

Punjab: Chamba state, Pangi, Chota Bambal reserve, 11,400', 16-7-1920. Parker (K). Pangi reserve, forest undergrowth, 10,000', 31-7-1919, Parker (K). Pangi, Saichu reserve, 9,000', 30-7-1920, Parker (K). Pangi, 9,500', R. R. Stewart 2786 (K). Pangi, Chalkot Forest, Lace 1634 (E).

Kumaun and Garhwal: Gangotri, 11,000', Oct. 1895, Davidson (K). Ganges valley near Jhola, 8—9,000', Duthie 991 (K); 991a (BM).

N.W.F. Province: Chitral Relief Expedition, Lowari Pass, 10,000', S. A. Harriss 16020 (K).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India,* N. Punjab, Kumaun Garhwal.

Flowering Period: May-August.

71. **Astragalus (Myobroma) webbianus** *Grah.* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount. 199.1835.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 132.1876.

Lectotype: Nako in Hungarung, Royle (LIV).

Bentham (1835) cites two specimens along with the original description i.e. (*i*) 'Inter rupee Sutlej, Wallich 5936' (*ii*) 'Nako in Hungarung, Royle'. 'Wallich

5936' is a very poor specimen, devoid of leaflets, flowers and fruits, hence Royle's specimen has been preferred.

Figure Reference: Nil.

Representative Specimens:

N. Punjab: Kunawar, 1835, Royle (K). Zingzingba, 14,000', Bor 13985 (K); (E). Upper Kunawar, 1851, Thomson (K). Lahul, Kenlung, 15,000', Bor 16495 (K); (E). Saichu valley, Pangi, Bhutaor, 11,400', 31-7-1920, Parker (G). Lahul, Yanansho, 16,000', Bor 15142 (E).

Kashmir: Tibet occ. 12—16,000', Thomson (G). Anesarbar, pierriers, 3900—4900 m., 15—16-8-1954, F. Schmid 2264 (G). Chhantir Gah, 3600m. 5—6-8-1954. F. Schmid 2168 (G).

Distribution: Kashmir; *India*, N. Punjab; *W. Tibet* (Map 61).

Flowering Period: June-July.

72. **Astragalus** (**Myobroma**) **flemingii** *Ali* in Kew Bull. 1958 (2): 311.1958.

Description: Root not seen. *Stem* reduced, covered by rachides. *Leaf* imparipinnate, stipulate, stipule ±.5—2.0 cm. long, ±.2—.6 cm. broad, pilose, margin entire, tip obtuse. Rachis ±11.0—42 cm. long. Petiole ±4.5—21 cm. long, uniformly pilose. Leaflets 21—41, petiolulate, petiolule ±.1 cm. pilose. Lamina ±.9—2.7 cm. long, ±.2—.6 cm. broad, linear, uniformly pilose below, glabrous above; margin entire, tip acute. *Inflorescence* 7—9 flowered, peduncled raceme. Peduncle ±6—31.5 cm. long, pilose. *Flower* bracteate, bract ±.8—1.3 cm. long, ±.2—<.3 cm. broad, pilose, acuminate. Pedicel ±.3—.5 cm., pilose, hairs white. *Calyx* uniformly pilose, cup on the upper side ±.9—1.0 cm., on the lower side ±1.0—1.1 cm., quinque denticulate, teeth ±.5 cm. *Corolla* yellow-orange (in dry conditon). Vexillum ±2.3—2.5 cm. long, ±.7—.8 cm. broad. Wing ±2.2—2.4 cm. long, ±.4 cm. broad, auricle ±.2—<.3 cm. long; claw ±1.3—1.4 cm. long. Keel ±2.1—2.4 cm. long, ±0.4 cm. broad, claw ±1.3—1.4 cm. long. *Stamens* diadelphous 9+1, filaments ±2.1—2.2 cm. long. *Ovary* stipitate, stipe ±.1 cm., ovary ±.8 cm. long, ±.2 cm. broad, densely pilose. Style ±1.5—1.8 cm. long, glabrous. Stigma capitate. Mature fruit not seen.

Holotype: Punjab, Comm. 3.1971, Salt range, J. L. Stewart 190 (K).

Synonymy:

1. *Astragalus bakuensis* auct. non Bunge: Baker in Hook. f., Fl. Brit. Ind. 2: 132.1876.

Figure Reference: Ali in Kew Bull. 1958 (2): t. 2 and 3.1958.

Representative Specimens:

N. W. India, 1871, J. L. Stewart 801 (E); Above Sabba, Petroleum Spring, lime stonehill, 4-3-'51, Fleming 39 (K); (E). (Paratypes).

Distribution: Endemic to Punjab.
Flowering Period: March.

73. **Astragalus (Myobroma) staintonianus** *Ali* in Candollea 17: 87. t. 13,16.1960.
Description: Perennial herb. *Root* long and woody. *Stem* partly underground; aerial stem very much reduced, with tuft of leaves. *Leaf* 5—8.5 cm. long, imparipinnate, stipule ±1.1 cm. long, c. .3—.4 cm. broad, glabrous; rachis ±2—4 cm. long. Leaflets 25—43, petiolule < .1 cm. long, lamina ±.3—.6 cm. long, ±.2.—4 cm. broad, elliptical, ovate, glabrous above (except the margin), pilose below; margin entire, tip obtuse. *Inflorescence* 4 flowered, peduncle .4—.5 cm. long. Flowers pedicellate, pedicel ±.3 cm. long, bract ±1 cm. long, linear. *Calyx* pilose, cup ±.9—1.0 cm. long; 2 upper teeth ±.6 cm. long, 3 lower teeth ±.5 cm. long. *Corolla* yellow with violet tip (in dry condition), vexillum ±1.9—2.2 cm. long, ±.8—1.0 cm. broad, tip retuse. Wing ±1.9—2.1 cm. long, ±.4 cm. broad, claw ±1.1—1.2 cm. long. Keel ±1.6 cm. long, ±.4 cm. broad, claw ±1.0—1.1 cm. long. *Stamens* diadelphous, 9+1, filaments ±1.6—1.8 cm. long. *Ovary* stipitate, stipe ±.1 cm. long, ovary ±.7—.8 cm. long, ±.2 cm. broad, densely pilose, hairs white, style glabrous, at about .2 cm. from the tip bent at right angles to the axis of the ovary. Stigma capitate. *Legume* sessile, ±1.7—1.8 cm. long, ±.5—.6 cm. broad, hairs white, partly bilocular. *Seeds* ±8. per fruit; kidney shaped, ±.3—.4 cm. long, ±.2 cm. broad, brown in colour.
Holotype: Chitral, Khot Au, 14,000′, 12-7-'58, J. D. A. Stainton 2874 (RAW). Cotypes: Kashmir, Anesarbar, Pierriers, 3,900—4,900 m., 15—16-8-'54, F. Schmid 2265 (RAW); deux versants de l'Ishkuman Aghost, 4,210—4,540 m., 15—16-8-'54, F. Schmid 2462 (G); Chitral haute vallee' de Yarkhun Hauts paturages, 4,000 m., 22—27-8-'54, F. Schmid 2327 (G).
Synonymy: Nil.
Figure Reference: Ali in Candollea. 1961.
Distribution: W. Pakistan, Chitral; *Kashmir.*
Flowering Period: July-August.

74. **Astragalus (Myobroma) rhizanthus** *Royle* ex Benth. in Royle, Illustr. Bot. Himal. Mount.: 200.1835.
Description: Baker in Hook. f. Fl. Brit. Ind. 2: 132.1876.
Lectotype: Leo, Kunawar, Royle (LIV).
Bentham (1835) cites 'Lippa Chango, Royle' and 'Leo in Kunawar, Royle' However in Royle's Herbarium there is only one specimen from 'Leo, Kunawar', which should be accepted as the lectotype.
Synonymy:
1. *Astragalus hindukushensis* Wendelbo in Nytt Mag. Bot. 1: 42.1952.
Wendelbo (1952) has distinguished this species from *A. rhizanthus* Royle

ex Benth. by virtue of the presence of the 'longer leaves, bigger numerous leaflets, which become glabrous adaxially when mature'. However all these characters are very variable. The observation of extensive material in British Herbaria including the lectotype *A. rhizanthus* Royle ex Benth. and the isotype of *A. hindukushensis* Wendelbo has convinced me of their conspecific nature.

Figure Reference: Wendelbo in Nytt Mag. Bot. 1: t. 15.1952.

Representative Specimens:

Kashmir: Astor to Rama, 9,000′—10,000′, R. R. Stewart 22876 (K). Kashmir, 9,000′, 1852, Thomson (K). Peer Punjal, below Allahabad sarai, 6-5-1847, Winterbottom 116 (K). Gilgit, Nittar valley, 9—10,000′, Duthie 12405 (K). Zanskar, 12—13,000′, 6.1848. Thomson (K). Ladakh, 8.1880, Munro (K). West Tibet, Ex. Herb. Flaconer (K). Mitzahoi, 11,000′, H. H. Rich 1144 (K). Zoji Pass, Matayan, 11,000′, R. R. Stewart 7485 (K). Deosai, 13,000′, Osmaston 93 (K). Tragbol, 10,200′, Clarke 29230 (K); 29243A (K). Tibet occ. 12—16, 000′, Thomson (K). Dras, 11,000′ R. R. Stewart 74011/2 (K). Rupal nallah, near Tarshing, 8—9,000′ R. R. Stewart 22829 (K). Dzamu, Padri pass to Bhadrar 17—22.7.1856, Schlagintweit (BM). Baltistan, Karpuchu valley, 13—14,000′, Duthie 11967 (BM); (E). Pir Patsaski or Kishtwar pass to Islamabad, 5—10-8-1856, Schlagintweit 5209 (BM). Zanskar, Padum via Abrang to Bok, 27—28-6-1856, Schlagintweit 7176 (BM). Kishenganga valley, Shankargarh to Rattu, upper Astor valley, R. R. and I. D. Stewart 22786 (RAW). Mitsahoi, Ladak road, 11,000′, R. R. Stewart 9946 (RAW). Astor to Rama, R. R. and I. D. Stewart 22876 (RAW). Ishkuman Aghost 4210—4540m. 15—16-8-1954, F. Schmid 2463 (G). Ano Gol vallée sèche, 3730—3240m. 9-11-1954. F. Schmid 2380 (G).

Punjab: Kunawar, 1835, Royle (K). Kyelang, 12,000′, Lahul, Bor 8706 (K); (E). Jhala, 12,000′, Lahul, Bor. 9722 (K); (E). Koksar, 10,500′, Lahul, Bor. 14530 (K); (E). Billing Lampa, Lahul, Bor 15235 (K); (E). Pangi, Punjab, Drummond 21907 (K). Sisu-Kyelang, Kulu-Lahul, Drummond 23497 (K); (G). Chota Bhandal reserve 8,500′, Parker 30 (K). Bashahr state, above Kibar Dogri, 10,000′, Lace 227 (E).

N.W.F. Province: Kurram valley, 5,000′, Collet 6 (K). Kurram valley 2-6-1880, Aitchison 51 (P); (K).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India,* Punjab; *Afghanistan* (Rechinger, 1957).

Flowering Period: June-July.

75. **Astragalus (Myobroma) zanskarensis** *Benth.* ex *Bunge,* Astrag. 1: 43.1868; 2: 67.1869.

Systematic position of the species:

The sections *Aegacantha* and *Myobroma* of the subgenus *Caprinus* are

differentiated according to the characters of the leaf. In *Aegacantha* the leaf is paripinnate, whereas in *Myobroma* it is imparipinnate.

A. zanskarensis Benth. ex Bunge was described by Bunge (1868, 1869) who placed it section *Aegacantha*. Subsequent workers (Baker, 1876; Parker, 1921) have also retained it under the same section. The holotype of *A. zanskarensis* Benth. ex Bunge is in Leningrad Herbarium and could not be observed by me. I have seen quite authentic collections in Kew Herbarium, identified by Bentham (i.e. Zanskar, 12—14,000′, 1852, Thomson). A critical study of these specimens revealed that actually the leaf is imparipinnate in this species. The terminal leaflet is deciduous and falls off quite early, however it may readily be observed in immature leaves. Therefore this species has been transferred to the section *Myobroma*.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 134.1876. This description should be modified as follows: leaf imparipinnate.

Holotype: Zanskar, 10—14,000′, Thomson (LE not seen). I have seen Thomson's specimens in Kew Herbarium.

Synonomy: Nil.

Figure reference: Nil.

Representative Specimens:

Kashmir: Zanskar, 10—14,000′, 1852, Thomson (K); (G); (BM); Baltistan, Namika La, 12,000′ Osmaston 142 (K); Dras Valley, Batkokin, Duthie 25575 (K); Pader on the northern foot of the Shinku La to Sirlla, 20—21-6-1856. Schlagintweit 6245 (BM).

Punjab: Lahul, Lingti, 13,000′, Bor 15031 (E).

Distribution: Kashmir; *India*, N. Punjab; 10—14,000′.

Flowering Period: June.

76. **Astragalus (Myobroma) pindreensis** (*Benth.* ex *Baker*) *Ali in* Kew Bull. 1958 (2): 312.1958.

Baker (1876) described this taxon as a variety of *Astragalus candolleanus* Royle ex Benth. and pointed out its affinity with A. *pyrrhotrichus* Boiss. in the structure of pods. The pods however resemble more closely those of *A. malacophyllus* Benth. ex Bunge. Thus this species is synthetic in nature, resembling *A. candolleanus* Royle ex Benth. in the characters of the leaves and *A. malacophyllus* Benth. ex Bunge in the structure of the pods.

Description: As Baker (1876) gives only the diagnostic features of the species and no description, the latter has been drawn up as follows:

Perennial herb. *Root* not seen. *Stem* up to 15 cm. long. Internodes .2—.8 cm. long, minutely hairy when young, glabrous when old, roughly cylindrical. *Leaf* stipulate, stipule lateral, ±.7—1.0 cm. long, minutely pilose, acute to auminate. Rachis 5.5—17 cm. long, pilose, leaflets 15—25, lateral ones gener-

ally opposite, rarely alternate, petiolulate, petiolule pilose, <.1 cm., lamina .4—.7 cm. long, ±2—.5 cm. broad, obovate, elliptical to broadly oblong, margin entire, tip obtuse-retuse, venation unicostate, reticulate; glabrous adaxially, pilose on the abaxial side, either uniformly, or only along the midrib and margin. *Inflorescence* 2—3 flowered, peduncled raceme. Peduncle 1—3.2 cm. long, pilose. *Flower* bracteate, bract±.4—.6 cm. long, ⩽.1 cm. broad, lanceolate, acuminate, pilose, hairs white and black, spreading. Pedicel ±.4 cm. long, pilose, hairs spreading, white and black. *Calyx* 1.2 cm. long, pilose, hairs black; upper teeth ±.3 cm. long, lower teeth ±.4 cm. long, acuminate. *Corolla* yellow tinged with orange (in dry condition); vexillum ±2.3 cm. long, ±.9 cm. —1.0 cm. broad, claw ±.5 cm., lamina obovate, base cuneate, tip retuse. Wing ±1.9—2.0 cm. long, ±.25 cm. broad, claw ±1.0 cm. long; auricle ±.1 cm. long. Keel ±1.6 cm. long, .4 cm. broad, claw 1.0 cm. long. *Androecium* diadelphous, 9+1, filaments ±1.7 cm. long. *Gynaecium*, ovary stipitate, stipe <.1 cm., ovary .5—.6 cm. long, densely pilose; style ±1.1 cm. long, minutely hairy, bent at right angles to the axis of the ovary at about .2 cm. from the stigma. Stigma capitate. *Fruit* sessile 1.3—1.9 cm. long, (excluding the pointed style), .6—.7 cm. broad, rounded at both ends, pilose, hairs yellow spreading; bilocular, dehiscent along the upper suture. *Seed* ±.3 cm. long, ±.2—<.3 cm. broad, reniform, glabrous, tan to chest nut brown in colour.

Lectotype: Garhwal, Falconer (K).

Synonymy:

1. *A. Candolleanus* var. *pindreensis* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2: 133.1876.

Figure Reference: Nil.

Representative Specimens:

Kumaun and Garhwal: Pindree, upper Garhwal, 12,000′, 1852, Madden (K). Almora Dist., Tuktung, Dhauli valley, 3,190 m. Parker 2104 (K); (BM). Upper Garhwal, Pindree, 12,000′, Madden 152 (E).

Punjab: Chamba State, above Bindraban, 10—11,000′, Lace 1464 (E).

Kashmir: Fras nag, Pir Panjal range, 9,000′, R. R. Stewart 23,140 (K). N. W. India, J. L. Stewart (E).

Distribution: Kashmir; *India*, Kumaun, Punjab.

Flowering Period: June-July.

77. **Astragalus (Myobroma) nicharensis** *Bunge*, Astrag. 1: 39.1868; 2: 50.1869.

Description: Bunge, Astrag. 2: 50.1869.

Holotype: Baluchistan, Nichara, Stocks 928 (K-untraceable).

I have seen 'Stocks 916' from Nichara in Kew Herbarium. 'Stocks 928'

is untraceable. The description as given by Bunge (1869) agrees perfectly with 'Stocks 916'.

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Nichara, Stocks 916 (K).

Distribution: Endemic to Baluchistan (Map 61).

Flowering Period: The specimen that I have seen does not bear the date of collection.

78. **Astragalus (Myobroma) purpurascens** *Bunge*, Astrag. 1: 35.1868: 2: 43.1869.

Description: Bunge, Astrag. 2: 43.1869.

Lectotype: Afghanistan, Griffith 1581 (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Palez, Gwal, Lace 3724 (E). Dilkuna, 5,000′, Lace 3679 (E). Kapota, Stocks 874 (K).

N.W.F. Province: Kurram valley, Harsukh 14919 (K). Waziristan, W. of Spinwam Fort, 3,000′—4,800′, Blatter and Fernandez 746 (K). N. of Dossali Fort. Blatter and Fernandez 1030 (K). Datta Khel, Fernandez 1192 (K). Loargai Narai 6,600′, Blatter and Fernandez 1313 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; *Afghanistan.*

This is the first record of this species from Waziristan.

Flowering Period: April.

79. **Astragalus (Acanthophace) aegacanthoides** *Parker* in Indian For. 49: 78.1923.

Description: Osmaston, For. Fl. Kumaun: 158. 1927.

Lectotype: N. Kumaon, Byans, Kali valley. 11,000′—15,000′, 27-5-1915, Lyall (K).

Synonymy: Nil.

Figure Reference: Parker in Ind. Fores.: t. 5.1923.

Representative Specimens:

Kumaon: Almora Dist., between Garbyang and Nabi, 3,150 m. Parker 2087 (K). Almora Dist., Nabi, 3,150 m. Parker 2089 (K). Nipchang valley, 11—14,000′, Duthie 2806 (K).

Distribution: India, Kumaon; *S. Tibet*. 10—12,500′.

Flowering Period: May-June (Osmaston, 1927).

80. **Astragalus (Acanthophace) diopogon** *Bunge*, Astrag. 1: 70.1868; 2: 117.1869.

Description: Bunge, Astrag. 2: 117.1869.

Lectotype: Baluchistan, Hurbab mountain, Nichara, Stocks 915 (K).

Bunge (1869) has also referred to 'Griffith 157' from Waziristan, which I have not seen.

Synonymy: Nil.

Figure Reference: Nil.

Distribution: W. Pakistan: N. W. Province, Baluchistan.

Flowering Period: The only specimen that I have seen of this taxon does not bear any date of collection.

81. **Astragalus (Aegacantha) genistoides** *Boiss.*, Diagn. Pl. Or. Nov. ser. 1 (9): 94.1849; Ali in Kew Bull. 1958 (2): 312.1958.

Description: Boissier, Fl. Or. 2: 305.1872. This description should be modified as follows: Wing and keel minutely pilose externally.

Boissier (1849) in the original description described the wing and keel as 'glabrous'. This mistake has been repeated by Boissier (1872) and Bunge (1868, 1869). A critical study of the type specimen in Kew Herbarium shows that the wing and the keel are minutely pilose.

Lectotype: Afghanistan, Griffith, 1054 (Ex. Herb. Hook.) (K).

Syntype: Afghanistan, Griffith 1055 (K); (G).

Astragalus genistoides Boiss. is based on 'Griffith 1054 and 1055 in Herb. Hook.' At Kew, Hooker's Herbarium contains only Griffith 1054 whereas Griffith 1055 comes from Bentham's Herbarium. Nevertheless, both of these sheets bear labels attached in 1869 (i.e. 20 years after the publication of the original description) Boissier's handwriting. In these circumstances 'Griffith 1054, Ex Herb. Hook' has been chosen as the lectotype.

Synonymy:

1. *Astragalus psilopterus* Bunge, Astrag. 1: 45.1868; 2: 71.1869.

Figure Reference: Rechinger f., in Biol. Skr. 9 (3): t. 99,100.1957.

Representative Specimens:

N.W.F. Province: Chitral, Barum Gol, Shokor Shal, 3500 m. 22-6-1950. Wendelbo (K).

Distribution: W. Pakistan, Chitral; Afghanistan.

Flowering Period: April-June.

82. **Astragalus (Aegacantha) psilocentros** *Fisch.* in Bull. Soc. Nat. Moscou 26 (2): 405.1853.

(*a*) var. **psilocentros**

Description: Parker, For. Fl. Punj.: 140.1924.

Holotype: Djillapour, Jacquemont 109 (P). Type No. (K).

Synonymy:

1. *Astragalus polemius* Boissier, Fl. Or. 2: 306.1872.

Figure Reference: Nil.

Kashmir: Saidabad, 1,900′, Clarke 28116 (K). Poonch to Trarkhel, 6,000′, A. Rashid, E. Nasir and R. R. Stewart 25546 (RAW).

N.W.F. Province: Naran, Kagan valley, Drummond 20064 (K). Waziristan, 3,500′, J. L. Stewart 537/K to K (K). Kurram valley, Aitchison 23 (K). Rosh nallah, north of Dosalli, Waziristan, Blatter and Fernandes 1028 (K). Jhelum Dist. Sohawa, 8-3-1944. S. S. Oberoi (RAW). Murree hills, Fleming 43 (E).

Punjab: Peshawar, Vicary (K). Rawalpindi, 20-3-'71. Aitchison 378 (K). Naushera, salt range, Shahpur, Parker 3441 (K). Dalwal, near Chitrawal, Drummond 21911 (K); (E); (G).

Baluchistan: Zahree, 1851, Stocks 712 (K); (G). (Type of *A. polemius* Boiss.). Baluchistan, Lace 3689 (E).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province, Punjab, *Kashmir*.

Flowering Period: March-May (Parker, 1924).

(*b*) var. **pilosus** Parker, For. Fl. Punj.: 140. 1924; Kew Bull. 1921: 270. 1921 (nom. nud.).

Description: Parker, For. Fl. Punj.: 140. 1924.

Lectotype: Normon on Chenab, N. W. India, 1851, Thomson (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Kumaun, Garhwal: Dhowli valley, 6,500—11,000′, M. P. Edgeworth 78 (K). Dhauli river, 7,000′, Strachey and Winterbottom 6a (K).

Punjab: Punjab, Aitchison (K).

N.W.F. Province: Peshawar to Hazara, J. L. Stewart 314/8 (K). Hazara, 3,500—9,000′, J. L. Stewart 474 (K). Naushehra, Hazara Dist., 3,500′, June 1910, Parker (K).

Distribution: W. Pakistan, Punjab, N.W.F. Province; *India*, Garhwal.

Flowering Period: March-May (Parker, 1924).

83. **Astragalus** (**Aegacantha**) **grahamianus** *Royle* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

Parker (1921), who revised the *Astragali* of the section *Aegacantha*, rejected the specific epithet *A. grahamianus* Royle ex Benth. on the grounds that the type specimen was missing and the original diagnosis and the illustration in his opinion, were not sufficient to identify the species conclusively. However, Royle's original herbarium has been rediscovered at Liverpool (Stansfield, 1953) and the type of this species is present there.

Description: The description of *A. cicerifolius* Royle ex Benth. as given by Parker, For. Fl. Punj.: 141. 1924.

Holotype: Hills surrounding Kashmir, Royle (LIV).

Synonymy:

1. *Astragalus cicerifolius* Royle ex Fischer, Bull. Soc. Nat. Moscou 24 (2): 404.1853.
2. *A. daltonianus* Bunge, Astrag. 1: 44.1868; 2: 69.1869.
3. *A. scariosus* Benth. ex Bunge, Astrag. 1: 44.1868; 2: 71.1869.

Figure Reference: Royle, Illustr. Bot. Himal. Mount.: t. 36, f. 2.1835.

Representative Specimens:

Kashmir: Haribel, 6,300′, Drummond 13945 (K). Gilgit Exped., Hunza Road, Pilchi to Nomul, 5,000′, Giles (K). Kashmir, 1852, Thomson (K). Skardo, 7,650′, Clarke 29946 (K). Sirinagar, 4—6,000′, Timins 45 (BM). Gilgit, near Hopar glacier, Nagar, 8—9,000′, R. R. Stewart 26500 (RAW). Gilgit, 5,000′, 28-7-1954, R. R. Stewart (RAW). Doarian and Shardi, Kishenganga valley, 5,900′—6,100′, 16—17-5-1954. F. Schmid (RAW). Chhantir gah, 3600 m. 5—6-8-1954, F. Schmid 2169 (G). Talas, vallee seche, 3,700 m. 12-8-1954, F. Schmid 2235 (G).

Punjab: Kunawar, 1835, Royle (K). Chamba, Aug. 1880, Robert Ellis (K). Pangi, between Kialr and Darwas, 8,000′, 16-8-1919, Parker (K). Pangi, 9,000′, Watt 790 (E).

N.W.F. Province: Naran, Kagan, 8,400′, 20-6-1899, Duthie Kagan, Hazara, Duthie 19343 (K): 19344 (K); 19339 (K); 19353 (K). Kagan, Malkandri, Duthie 21235 (K). Above Ushu, 8—9,000′, R. R. Stewart and A. Rahman 25287 (BM). Kulali to Kalam, 6,000′, R. R. Stewart and A. Rahman 25092 (BM).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India*, N. Punjab (Map 65).

Flowering Period: April-August (Parker, 1924).

84. **Astragalus (Aegacantha) multiceps** *Benth.* in Royle, Illustr. Bot. Himal. Mount. 199.1835.

Bentham (1935) originally published *Astragalus multiceps* with reference to Wallich and cited the following two specimens: (*i*) Sirmore, Wallich 5237 (*ii*) Shalkur in Huungarung, Royle. The catalogue number of Wallich's specimen is wrong, for Wallich 5237 is an *Acacia* and not an *Astragalus*. The correct number as listed in Wallich Catalogue for *A. multiceps* is 5957.

The fact that the two specimens mentioned above belong to two different species was realised by Bentham, as the specimen in his herbarium bears 'Astragalus multiceps non Wallich, Kunawar, Royle, 1835'. Parker (1921) although rightly concluding that the description given by Bentham agrees better with the Royle's specimen rather than those of Wallich, has dropped this

name altogether. This is not justified, in the light of Art. 66, for in this case it is reasonable to adopt Royle's specimen as the type.

Description: The description of *A. jacquemontii* Bunge as given by Parker For. Fl. Punj.: 141.1924.

Type: Shalkur in Hungarung, Royle (Untraceable) Kunawar, 1835, Royle (K).

Synonymy:

1. *A. jacquemontti* Bunge, Astrag. 1: 44.1868; 2: 68.1869.
2. *A. grahamianus* auct. non Royle ex Benth: Fischer in Bull. Soc. Nat. Moscou 26 (2): 406.1853.
3. *A. leptocentrus* Bunge, Astrag. 1: 44.1868; 2: 68.1869.

Figure Reference: Nil.

Representative Specimens:

Punjab: Kunawar, 1835, Royle (K). N. W. India, Royle (K). Purbani to Ribba, Bashahr, Lace 234 (K); (E). Piti; 14,000′, Thomson (K).

Distribution: India, N. Punjab, 9—14,000′ (Map 59).

Flowering Period: May (Parker, 1924).

85. **Astragalus (Aegacantha) bicuspis** *Fischer* in Bull. Soc. Nat. Moscou 26 (2): 406.1853.

Description: Parker, For. Fl. Punj.: 142.1924.

Holotype: Between Lapau and Poya (Upper Kunawar), 3,000′—3,500′, Jacq. 1695 (P). Type No. (K).

Synonymy: Nil.

Figure References: Nil.

Representative Specimens:

Kashmir: Rama to Gorikot, 8—9,000′, R. R. and I. D. Stewart 22942A (K). Das Kirim, Balti, Winterbottom 686a(K). Astor, 7,600′, Giles (K). Gudhai valley, Astor, 9—10,000′, Duthie 12229 (BM); (E). Astor to Bunji, 4—7,000′, 28-5-1954, F. Schmid (RAW). Rattu, R. R. and I. D. Stewart 22807A (RAW); 18816 (RAW). Entre Astor et Bunji, 1300—2300 m., 30-5-'54. F. Schmid 1812 (G).

Punjab: Kyelang, Kulu, Lahul, Drummond 23475 (K): (E). Kyelang, 11,500′, Lahul, Bor 14714 (K); (E). Gondla, Lahul, 10300′, Bor 12413 (K). Tindi, Pangi, Chamba, Parker 24-7-1919, Parker (K). Kulu, Lahul, Lower Chandra valley, Drummond 23474(E).

Distribution: Kashmir; *India,* N. Punjab.

Parker (1924) has reported it from Baluchistan also, but I have seen no specimens of this species from there.

Flowering Period; June-August (Parker, 1924).

86. **Astragalus (Aegacantha) hemsleyi** *Aitch. & Baker* in J. Linn. Soc. (Bot.) 19: 158.1881.

Description: Aitchison and Baker in J. Linn. Soc. (Bot.) 19: 158.1882.

Lectotype: Hariab Dist., Afghanistan, 1880, Aitchison 80 (K); (BM).

Syntype: Hariab Dist., Afghanistan, June 1880, Aitchison 61 (K). Sarghal to Biankhel, Kurram valley, 5-6-1879, Aitchison 1215 (K).

Synonoymy:

1. *Astragalus canispinus* Boiss. Fl. Or. Suppl.: 181. 1888.

Figure Reference: Rechinger f. in Biol. Skr. 9 (3): t. 131, 132.1957.

Representative Specimens:

Baluchistan: Ziarat, 7—9,000′, H. Crookshank 242 ex parte (K). Baluchistan, 1891-94, C. F. Elliot (K). Pil hill, May, 1888, Lace (E). Ziarat, 8,000′, Lace 3843 (E).

N.W.F. Province: Kurram valley, 8—9,000′, Harsukh, 14830 (K).

Distribution: Pakistan, Baluchistan, N.W.F. Province; *Afghanistan,* Hariab Dist.

Flowering Period: May-June.

Systematic Position of the species:

Sections *Aegacantha* Bunge and *Acanthophaca* Bunge differ in the colour of the corolla and the character of the fruits. Bunge (1888, p. 20) characterised sections *Aegacantha* and *Acanthophace* by golden yellow and purple flowers respectively. In both he has described bilocular fruits (Bunge, 1868, p. 43, 45). However, later on he changed the diagnosis (Bunge, 1869, p. 72) and mentioned unilocular fruits for *Acanthophace*. Boissier (1872) has more or less maintained the characters attributed to these two sections by Bunge. According to him the two sections differ as follows:

Acanthophace	*Aegacantha*
1. Corolla purple to 'leucophasea'.	1. Corolla golden yellow, rarely purple violet.
2. Fruit unilocular.	2. Fruit bilocular.

The present species was erroneously placed by Aitchison and Baker (Aitchison, 1881) in section *Acanthophace*. In the latin description the colour of the corolla is described as "purpurescentibus"; however, in the note that follows the description, flowers are stated to be 'greenish, tipped with rose pink'. In the dried specimens at Kew Herbarium, however, the corolla appears to be orange yellow. Aitchison and Baker wrongly described the fruit to be unilocular, though the fruits in the lectotype at Kew are completely bilocular. Much importance cannot be given to the colour of the corolla and the decisive character in this case is that of the fruit. Hence *A. hemsleyi* should be placed in Sect. *Aegacantha*.

Although Boissier (1888) seems to have recognised this mistake, he has confused *A. hemsleyi* Aitch. & Baker with *A. canispinus* Boiss. Further discussion about their circumscription is given under *A. pseudo-psilacanthus* Ali.

87. **Astragalus (Aegacantha) psilacanthus** *Boissier*, Diagn. Pl. Or. Nov. Ser. 1 (9): 97.1949.

Description: l.c.

Holotype: Afghanistan, Griffith 1051, ex Herb. Hooker (K).

Only a part of this specimen is available at Kew Herbarium, rest of the sheet is missing.

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Khojak pass, Duthie 8638 (K); Shelabagh, Duthie 8638 (BM); (G); Shelabagh, 6,000′, Lace 3529 (E); (K); Pil Hill, May, 1888, Lace (E).

N.W.F. Province: Kurram valley, Parachanar, Harsukh 14753 (K); Near Kurram, Habib Kalla, Aitchison 76 (K); 174 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; Afghanistan.

Flowering Period: April-May.

88. **Astragalus (Aegacantha) pseudo-psilacanthus** *Ali* in Kew Bull. 1958 (2): 313.1958.

Description: Perennial herb, ±10 cm. in height. *Root* woody, elongated. *Stem* cylindrical, almost completely covered by persistent leaf bases. *Leaf* paripinnate, stipulate; stipule lateral, ±.3—.6 cm., membraneous, acute, minutely pilose to glabrous. Rachis ±2—3.5 cm. long, sparsely pilose, hairs pale yellow, spreading. Petiole ±.7—1.5 cm. Leaflets 12—18, petiolulate, petiolule<.1 cm., lamina ±.2—.6 cm. long, >.1—.2 cm. broad, obovate, oblong-obovate; sparsely pilose on both the sides, hairs pale yellow, spreading; margin entire, tip obtuse, mucronate. *Inflorescence* 2—4 flowers in the axil of the leaf. *Flower* pedicellate, pedicel ±.3 cm., pilose, bract ±.4 cm. pilose, acute. *Calyx* sparsely pilose outside; cup .8—.9 cm., 2 upper teeth ±.3 cm., 3 lower teeth .3—<.4 cm., acute. *Corolla* yellowish orange (in dry condition). Vexillum ±2.1 cm. long, ±.7 cm. broad, panduriform; wing ±1.9 cm. long, ±<.3 cm. broad, claw ±1.1—1.2 cm. long. Keel ±1.6 cm. long ±.3 cm. broad, claw ±1.1 cm. long. Stamen diadelphous 9+1, filaments 1.6 cm. long. *Ovary* stipitate, stipe ±.2 cm. long, glabrous; ovary ±.5 cm. long, ±.1 cm. broad, densely pilose. Style ±1.0 cm. long, glabrous, bent at right angles at about ±.2 cm. from the tip. Stigma capitate. *Fruit* stipitate, stipe ±.1 cm., pod 1.0 cm. long, ±.5 cm. broad, uniformly pilose, hairs pale yellow; many seeded, partially bilocular, dehiscing along the upper suture. *Seed* ± .3 cm. long, ±.2 cm. broad, reniform, glabrous, fuscous reddish brown in colour.

Holotype: Kurram valley, June 25, 1880, Aitchison 47; 241 (K).
Paratypes: Kurram valley, from Kurram to Zabardast Kalla and Sikaram, Aitchison 451; 485 ex parte (K) (Map 66).
Synonymy: Astragalus hemsleyi sensu Boiss., Fl. Or. Suppl.: 182. 1888, non Aitchison and Baker.
Figure Reference: Ali in Kew Bull. 1958 (2): t. 4.1958.
Distribution: W. Pakistan, N.W.F. Province.
Flowering Period: May-June.

89. **Astragalus (Aegacantha) hostilis** *Boissier*, Fl. Or. 2: 306.1872.
Description: Boissier, Fl. Or. 2: 306.1872.
Holotype: Baluchistan, Nichara, Stocks 917 (K); (G).
Synonymy: Nil.
Figure Reference: Rechinger f. in Biol. Skr. 9 (3): t. 104, 105, 1957.
Representative Specimens:
Baluchistan: Ziarat, 7—9,000′, Crookshank 242 ex parte (K). Shaidan State forest, 3,000′, 28-4-1893, Duthie (K).
Distribution: Endemic to Baluchistan.
Flowering Period: April-June.

90. **Astragalus (Aegacantha) polycanthus** *Royle* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199. 1835.
Description: Parker, For. Fl. Punj.: 142.1924.
Holotype: Scongnum in Kunawar, Royle (LIV); (K).
Synonymy:
1. *Astragalus tenuispinus* Bunge, Astrag. 1: 44.1868; 2: 70.1869.
2. *A. microphyllus* Jacq. Journ. 2: 259.1841 (nom. nud.), nec Linn. (1753).
Figure Reference: Nil.
Representative Specimens:
Punjab: Kunawar, 1835, Royle (Isotype) (K). Ghauti, 3,000m., Jacq. 1543 (K).
Kashmir: Dras, 11,000′, R. R. Stewart 7042 (K).
Distribution: Kashmir; *India*, N. Punjab. 9—15,000′ (Parker, 1924).
Flowering Period: July (Parker, 1924).

91. **Astragalus (Aegacantha) oplites** *Benth.* ex *Parker* in Kew Bull. 1921: 270.1921.
Description: Parker, For. Fl. Punj.: 143.1924.
Holotype: Tibeto-occidentali, 10—14,000′, Thomson (LE-not seen).

I have seen the specimens in Kew Herbarium collected by Thomson from the above locality. There are three sheets bearing the same label, out of which, as stated by Parker (1921), two have mixed gatherings. However the third sheet collected from Leh, on July 7, 1848, represents only this taxon.

Synonymy:

1. *Astragalus cicerifolius* Royle ex Bunge, Astrag. 1: 44.1868; 2: 70.1869, non Royle ex Fischer (1853).

Figure Reference: Nil.

Representative Specimens:

Kashmir: Leh, July 7, 1848, Tibet Occ., 10—14,000′, Thomson (K). Nubra, 14,000′, 1852, Thomson (K). Taultak, Ladakh, 16,000′, Koelz 2476(K). Leh, 1—15-7-1856, Schlagintweit (RM). Tibet, Occ., 10—14,000′, Thomson (E). *Kumaun and Garhwal:* Garhwal, Ex Herb. Falconer (K).

Distribution: Kashmir; *India*, Garhwal; *Chinese Turkistan*, Yarkand.

Flowering Period: June-September (Parker, 1924).

Subgenus *Calycocystis*.

Artificial Key to the species:

1. Stipules encircling the stem, hairs on leaflets appressed ... (92) *A. nivalis.*
2. Stipules not encircling the stem, hairs on leaflets spreading ... (93) *A. breviscapus.*

92. **Astragalus (Hypsophilus) nivalis** *Kar. & Kir.* in Bull. Soc. Nat. Moscou 15: 34.1842.

Description: Baker in Hock. f. Fl. Brit. Ind. 2: 137.1876.

Synonymy:

1. *Astragalus thomsonianus* Benth. ex Bunge, Astrag. 2: 234. 1869, pro. sym.

Figure Reference: Nil.

Representative Specimens:

Kashmir: Sassar, 15—16,000′, 13-8-1848, Thomson (K). Zanskar and Sapar Tibet, 16,000′, 1852, Thomson (K). Ladakh, Depsang Plateau, 16,500′, Ludlow 462 (BM). Shyok valley, 15,800′, Ludlow 566 (BM). W. Tibet, Kangi, 10,000′, July, 1905, A. Meebold 1387 (G).

Punjab: Serchu, Lahul, Bor 15105 (K). Kangra, Lahul, Drokpo Gongma, 15,000′, W. Koelz 6901 (G). Kangra, Lahul, Serchu, 13,000′, W. Koelz 6656(G). Lahul, Kenlung, 15,000′, Bor 16477 (E).

Distribution: Kashmir; *India*, N. Punjab; *Tibet*; *Russia*, Dzungaro-Tarbagatai, Tien Shan (Gontscharov and Popov, 1946).

Flowering Period: June-August.

93. **Astragalus (Chaetodon) breviscapus** *B. Fedtsch.* in Acta Horti petropol. 24: 234.1905.

Description: B. Fedtschenko in Acta Horti petropol. 24: 234.1905.

Holotype: Tien Shan, Managildui to Alabugi, 4-6-1880, 6—7,000′, A. Regal 477 (LE-not seen).

Synonymy:

1. *Astragalus oophorus* Freyn in Bull. Herb. Boiss. Ser. 2, 5: 1019. 1905, non S. Wats (1871).

I have not been able to verify this synonym. It has been listed following Gontscharov and Popov (1946).

Figure Reference: Nil.

Representative Specimens:

Kashmir: Gilgit Exped., 8,700', Giles 142 (K). 'Holshal pres Nagar, 3100—3250m., F. Schmid 1559 (G).

Distribution: Kashmir; *Russia*, Tien Shan, Pamir Alai (Gontscharov and Popov, 1946).

Flowering Period: April.

I have not seen any authentic specimen of this species. In Kew Herbarium 'Giles 142' has been identified by W. Lipsky as *A. oophorus* Freyn. 'Schmid 1959' cited above is exactly similar to this specimen. However, there are nomenclatural objections against *A. oophorus* Preyn, for it is a later homonym of *A. oophorus* S. Wats (1871). Therefore, following Gontscharov and Popov (1946), who have cited *A. oophorus* Freyn as a synonym of *A. breviscapus* B. Fedtsch., I have adopted the latter name for this species.

Subgenus Cercidothrix.

Artificial Key to the Species:

1. Stigma penicillate	...	2
Stigma not penicillate	...	3
2. Leaf imparipinnate, rachis not indurated, not spiny		(94) *A. trichocarpus*
Leaf paripinnate, rachis indurated, spiny	...	(95) *A. stocksii.*
3. Stipules united at the base, encircling the stem	...	4
Stipules free, lateral; not encircling the stem	...	5
4. Pod ±1.1 cm. or less (±.8—1.1 cm.) lanate, hairs spreading	...	(96) *A. squarrosus.*
Pod more than 1.1 cm. long (±1.5—2.3 cm.), pilose, hairs appressed	...	(97) *A. peduncularis.*
5. Aerial stem absent, internodes reduced, smaller than the stipules	...	6
Aerial stem elongated, internodes longer than the stipules	...	8
6. Leaflets elliptical, acute, calyx with vertical black lines	...	(98). *A. khalifatensis.*
Leaflets obovate, obtuse, truncate, calyx without vertical lines	...	7.
7. Calyx teeth .3 cm. (±.2—.3 cm.)	...	(99) *A. brahuicus.*

	Calyx teeth more than .3 cm. (.4—.6 cm.)	... (100) *A. sykesiae.*
8.	Hairs on fruits spreading, vexillum rhomboidal	... (101) *A. xanthoxidiopsis.*
	Hairs on fruits appressed, vexillum not rhomboidal	9
9.	Calyx tubular, more than 1 cm. long	... 10
	Calyx less than 1.0 cm. long	... 12
10.	Calyx with vertical black lines	... (98) *A. khalifatensis.*
	Calyx without vertical black lines	... 11
11.	Vexillum more than twice the calyx cup, fruit straight	(102) *A. subuliformis.*
	Vexillum less than twice the calyx cup, fruit slightly curved	... (103) *A. suffalcatus.*
12.	Fruit semilunar (Fig. 3G)	... (104) *A. hamosus.*
	Fruit not semilunar	... 13
13.	Fruit c. 1.7 cm. long (±.2 cm. broad)	... (105) *A. imitensis.*
	Fruit upto 1.2 cm. long.	... (106) *A. fatmensis.*

94. **Astragalus (Caraganella) trichocarpus** *Grah.* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 121.1876. This description should be supplemented as follows: Leaflets 21—41.

Holotype: Sirmore, G. Govan (LIV.)

Synonymy:

1. *Astragalus sesbanoides* Royle ex Benth. in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

A. trichocarpus Grah. ex Benth. and *A. sesbanoides* Royle ex Benth. were published on the same date. However, Baker (1876) was the first to recognise them to be conspecific and he has adopted *A. trichocarpus* Grah. ex Benth., which is the correct name of the taxon.

In this connection my thanks are due to Dr. R. C. Barneby, for kindly informing me about the work where *A. trichocarpus* (T. & G.) M. J. Young (1873), a later homonym, was published.

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Darosh nallah, 7,500′, Chitral, Toppin 354 (K).

Punjab: Near Pulga, Kulu, Lahul, 9,000′, Drummond 23505 (K). Simla, Madden (K). Simla, 7,000′, Collect 706 (K). Chakrata, Jaunsar, 7,000′, Gamble 22857 (K). Krol, Drummond 21919 (K). Bashahr, Kotgarh to Nirt, Lace 811 (E).

Kumaun and Garhwal: Nainital and Chenab valley, 7,000′, Thomson (K). Mussoorie, Royle (K). Ranikhet, 6,000′, Lady of Legge 57 (K). Nainital, 7,000′, Strachey and Winterbottom 1 (K); (BM). Tehri Garhwal, 5—6,000′,

4-6-1894, Duthie (G). Mussoorie, 6,000′, April, 1919, A. Anderson (E). Garhwal, Kowria gulla, 6,000′, Thomson 591 (K).

Baluchistan: Ziarat, 8,000′, S. A. Harriss 16015 (K).

Distribution: W. Pakistan, Baluchistan, N.W.F. Province; *India*, N. Punjab, Kumaun, Garhwal.

Flowering Period: April-June.

95. **Astragalus (Caragenella) Stocksii** *Bunge*, Astrag. 1: 6.1868; 2: 4.1969.

Description: Boissier, Fl. Or. 2: 492.1872.

Lectotype: Baluchistan, Stocks 723 (K).

Syntype: Afghanistan, Griffith 1509 (K).

Synonymy:

1. *A. mokurensis* Sirj. and Rech. f. in Biol. Skr. 9 (3): 175. 1957.
2. *A. stocksii* var. *elongatus* Bunge, Astrag. 2: 5.1869.
3. *A. stocksii* var. *honigbergeri* Sirj. in Repert. Sp. Nov. 52: 15.1943.

Figure Reference: Nil.

Representative Specimens:

N.W.F. Province: Waziristan, 3,500′, J. L. Stewart 1183K to K(K). Waziristan, Barwand, 4,000′, Harsukh 15729 (K). *Baluchistan:* Quetta, Duthie 8639 (K); (BM). Baluchistan, Stocks 140 (K). Qardulu Bagh, Hurnai valley, 29-4-1886, Lace (K). Fort Sandemen, 4,600′, Duthie 18835 (K); 18840 (K). Urak, 7,000′, Crookshank 64 (K). Murdar Kach, Lace 4050 (E). Environs de Quetta, bas val de l'Hanna, 1700—2,000m. 28—29-4-1953, F. Schmid 115 (G).

Distribution: W. Pakistan, N.W.F. Province, Baluchistan, *Afghanistan*.

Flowering Period: April-May.

96. **Astragalus (Ammodendron) squarrosus** *Bunge*, Astrag. 1: 129. 1868; 2: 226. 1869; Ali in Kew Bull. 1958 (2): 315.1958.

var. **Squarrosus**

Description: Boiss. Fl. Or. 2: 487.1872. This description should be modified as follows: leaflets 3—5 per leaf.

Lectotype: Baluchistan, Peeshee Bhent, Gundooa Pass, Stocks 761 (K).

I have also seen 'Griffith 1541 (K); (P)', 'Inter Kolechi-Schimsch and Kerman, 27-4-1859, Bunge (P)' and 'Iter persicum, inter Jesd et Isfahan, May, 1859, Ex. Herb. Bunge (K)'. However, Stocks' specimens (Stocks 716) are better and more complete, hence my preference for designating it as the lectotype.

Synonymy:

1. *A. macrobotrys* Bunge, Astrag. 1: 129.1868; 2: 226.1869.

Bunge (1868) differentiated *A. squarrosus* Bunge from *A. macrobotrys* Bunge as follows:—

'Folia supra glabrata viridia, remi longissimi herbacei virgati — *A. macrobotrys* Bunge'.

'Folia utrinque cana, rami breves squarrosi — *A. squarrosus* Bunge'.

Boissier (1872) has placed the two species in two different groups, separated from each other on the basis of the length of the petiolules of leaflets. In *A. macrobotrys* the number of leaflets is stated to be 3–5, whereas in *A. squarrosus* only three leaflets have been reported (Bunge, 1868; Boissier, 1872; Parsa, 1848). However, these characters are quite variable even in the same plant. Therefore *A. macrobotrys* has been reduced to synonymy.

Figure Reference: Nil.

Representative Specimens:

W. Pakistan:

Baluchistan: Baluchistan, 1891-94, Elliot (K). Baluchistan, Stocks (K). Sorsange, 8,000′, Crookshank 312 (K). Ugai, 6,000′, Lace 3570 (K). Peshin, 5,200′, 17-4-1888, Lace 3570 (E). Kanozai valley, Duthie 18830 (K). *Afghanistan:* Griffith 437 (K); 494 (K); 1102 (K); 1102A (K); 1541 (K). *Persia*: 'Iter persicum, Chorassan, inter Schahrud et Nischapur, Jun. 1858, Ex. Herb. Bunge (K); (P). Torbat Heydari, 1000m, 13-5-1939, Parsa 674 (K). 'Inter Rudbar et Mendschil vallis fluvii Sefidrud, 350m, J. et A. Bornmuller 6828 (K); (P); (G). 'Khorasan, In arenosis inter Fariman et Turbat-e-Sheikh Djam, 4—6-7-1937, Rechinger 1369 (K). 'Khorasan, inter Robat-Safid et Turbat-e-Haideri, 10—11-7-1937, Rechinger 1559 (K). 'Inter Jead et Isfahan, May, 1859, Ex. Herb. Bunge (K); (P). Sabsewar, 15-6-1858, Ex. Herb. Bunge (P). *Russia:* 'Regio transcaspica, Kisil Arwat, Karala, in collibus arenosis ad stara, Karakala, 26-5-1901, P. Sintenis 1822 (P); (G). Planta Turcomaniae, Dominion Buchara, Farab, D. Litwinow 864 (G). Turkistania, Buchara, in declinibus argilloso-arenosis pr. Farab (ad fl. Amu-Darya), M. Kelow et N. Androssow 1318 (G).

Distribution: W. Pakistan, Baluchistan; *Afghanistan*: *Persia*; *Russia*, Buchara, Transcaspian region.

Flowering Period: May-June.

var. **sangonensis** (*Sirj. & Rechinger f.*) *Ali* in Kew Bull. 1958 (2): 316.1958.

Diagnosis: It differs from var. *squarrosus* in having black and white hairs on its calyx. In var. *squarrosus* only white haris are present.

Sirjaev and Rechinger f. (1954) differentiate *A. sangonensis* Sirj. from *A. macrobotrys* Bunge as follows: 'petiolis foliolo singulo brevioribus, foliolis supra pilosulis, pedunculis brevioribus, calyce nigro-nec albo piloso'. The holotype (Rechinger f., Aellen and Esfandiari 4075) (Fig. 70) was obtained on loan through the courtesy of the authorities of Vienna Herbarium. By the comparison of this specimen with *A. squarrosus* Bunge (including *A. macrobotrys*) it is quite clear that it differs from *A. squarrosus* only by virtue of the presence of black and white hairs on the calyx and bract. All the other characters mentioned above are quite variable, therefore this taxon has been accorded varietal rank.

Description: Sirj. and Rechinger f. 1. c. 1954.

Holotype: Persian Baluchistan, Mt. Taftan, Sangon, ca. 1600m. 19-5-1948, Rechinger f., Aellen and Esfandiari 4075 (W).

Synonymy:

1. *A. sangonensis* Sirj. and Rech. f. in Auz. Osterr. Akad. Wiss.-Math-nat. 91: 164.1954.
2. *A. pseudosquarrosus* Sirj. and Rechinger f. in Osterr. Akad. Wiss.-Math.-nat. 91: 164.1954.

The holotype of this species[Persian Baluchistan, between Zahedan(Duzdab) and Khash (Vasht, Kwash, (ca. 1300—1600m. 15-5-1948, Rechinger f., Aellen and Esfandiari 4280 (W)] was borrowed through the courtesy of the authorities of Vienna Herbarium. It is a poor specimen, having only one fruit and one flower (Fig. 71). According to Sirjaev and Rechinger f. (1954) this species differs from *A. squarrosus* Bunge in having black and white hairs on the calyx and shorter and stipitate pods. These characters have been discussed below:

(*i*) *Length of the pod:* As stated earlier, in the holotype there is only one fruit, which is $\pm$.5 cm. long (excluding the basal stipe and the apical mucro). In *A. squarrosus* the mature pod is generally .7—.9 cm. In the holotype of *A. pseudosquarrosus* it is indeed doubtful whether the pod has fully matured or not. Moreover, by observing only one pod, when the difference is of the order of $\pm$.2 cm., it is not possible to attach any taxonomic importance to it.

(*ii*) *Stipe of the Pod:* The stipe of the pod has been stated by Sirjaev and Rechinger f. (1954) to be $\pm$1 mm. long, in contrast to *A. squarrosus* Bunge where the pods are stated to be sessile (Sirj. and Rechinger f., 1954; Boissier 1872; Bunge, 1868). The specimens cited by Bunge, along with the original description of *A. squarrosus* Bunge (i.e. Stocks 761; Griffith 1541) were examined. These specimens show that the earlier workers (Bunge, 1868; Boissier, 1872) used the term 'sessile' in a loose sense. The length of the stipe in these specimens is $\leqslant$.1 cm. Hence it is clear that in this character also *A. pseudosquarrosus* is similar to *A. squarrosus*.

A. pseudosquarrosus differs from *A. squarrosus* Bunge only in having black and white hairs on the calyx and bract. In this it resembles *A. sangonensis* Sirj. & Rechinger f., of which it is therefore a synonym.

Figure Reference: Nil.

Representative Specimens:

Persia: Persian Baluchistan, between Zahedan (duzdab) and Khash (Vasht, Kwash), ca. 1300—1600m., 15-5-1848, Rechinger fil., Aellen and Esfandiari 4280; holotype of *A. pseudosquarrosus* (W).

Russia: Regio transcaspica, Kisil Arwat, in collibus, 3-5-1901, P. Sintenis 1597 (P); (G).

Afghanistan: Baghdis, 19-5-1885, Aitchison 1052 (K).
Distribution: Afghanistan, Baghdis; *Persia*; *Russia*, Kisil Arwat.
Flowering Period: June.

97. **Astragalus (Eudomus) peduncularis** *Royle* ex *Benth.* in Royle, Illustr. Bot. Himal. Mount.: 199.1835.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 136. 1876. This description should be modified as follows: (*i*) Stipules united about the middle, encircling the stem, tip acute. (*ii*) Pods pilose, hairs white and black, appressed.

The description of stipules and fruits as given by Baker (1876) and Blatter (1927) is not correct. The original description of the species as published by Bentham (1835) was quite correct though very brief.
Holotype: Pungee in Kunawar, Royle (LIV).
Synonymy:

1. *Astragalus corydalinus* Bunge in Acta Horti petropol. 3: 101. 1874 (?).

I have not seen the type or any authentic specimen of this species. Lipsky (1910), Popov and Vvedensky (1928) and Gontscarov (1946) have trated it as a synonym of *A. peduncularis* Royle ex Benth. Gontscharov (1946) has referred to "Exs. Herb. Fl. Asiae Mediae, no. 393". I have observed this specimen in Kew Herbarium. It differs from typical *A. peduncularis* Royle ex Benth. in calyx teeth. In this specimen no calyx tooth is more than .1 cm., whereas in typical *A. peduncularis* Royle ex Benth. the lateral calyx teeth are ±.2 cm. long. If the intermediates between the two forms do not exist, it may be desirable to recognise the Central Asian plant as a separate taxon. However, as I have seen only one specimen from Tien Shan I have retained *A. corydalinus* Bunge (the Central Asian form) as a doubtful synonym of *A. peduncularis*.
Figure Reference: Nil.
Representative Specimens:

N.W.F. Province: Chitral, Toppin 462 (K).

Kashmir: Baltistan, Shingo valley, 10—11,000′, Duthie 11886 (K); (BM); (E). Astor valley, Mushkin forest, 9—10,000′, Duthie 12271 (K). Rupal Nullah, Astor Dist., 8,000′, R. R. Stewart 22,842 (K). Dras, 9,000′, 24-9-1848, Thomson (K). N. W. India, Royle (K). Baltistan, Turmith Nallah, 9,000′, Ludlow 314 (BM). 'Entre Rattu et Gurikot, 2500—2800m, 25-5-1954, F. Schmid 1786 (G). Zaskar, Char, 13,000′, W. Koelz 5677 (G). Holshal pres Nagar, Pentes seches dirigees au nord, 3100—3250m. 20-6-54, F. Schmid 1965 (G).

Punjab: Above Kyelang, Kulu, Drummond 23495 (K); (G). Kulu, Drummond 23496 (K). Kyelang, 10,400′, Bor 14694 (K); (E).

Distribution: W. Pakistan, N.W.F. Province; *Kashmir*; *India*, N. Punjab; *Russia*, Tien Shan, Pamir Alai (Gontscharov, 1946).
Flowering Period: June-July.

98. **Astragalus (Corethrum) khalifatensis** *Ali* in Candollea 17: 91. t. 15, 18.1960.
Description: Perennial herb. *Root* thin, elongated. Aerial *stem* very much reduced, internodes covered with stipules. *Leaf* .6—1.3 cm. long (excluding the terminal leaflet). Stipule lateral, ±.1—.2 cm., deltoid, pilose towards the outer side, glabrous within. Petiole ±.3—.8 cm. long; leaflets 9, petiolulate petiolule <1 mm.; lamina ±.25—.5 cm. long, ±.1—.15 cm. broad, margin entire, tip obtuse. *Inflorescence* umbelled raceme. Peduncle ±.3—4.5 cm. long, pilose, hairs black and white. Bract ±.1—.2 cm. long, ±.1 cm. broad, pilose. Pedicel ±.15 cm. long. *Calyx* 1.8—1.7 cm. long, pilose, hairs black and white, black hairs arranged in vertical rows; teeth ±.3—<.4 cm. long. *Corolla* orange in colour. Vexillum ±2.0 cm. long, ±.6 cm. broad, tip retuse. Wing 1.9 cm. long, ±.15 cm. broad, claw ±1.2 cm. long, auricle +0.5 cm. long. Keel ±1.6—1.7 cm. long, ±.25 cm. broad, claw ±1.1—1.2 cm. long. *Stamens* diadelphous, 9±1, filaments 1.7—1.8 cm. long. *Ovary* stipitate, stipe ±.2 cm. long, ovary ±.6 cm. long, ±.1 cm. broad, glabrous, style ±.9—1.0 cm., slightly curved near the tip; stigma capitate. *Fruit* not seen.
Holotype: Beloutchistan, sommet du Khalifat pres' de Ziarat, 3,300 m., 7-5-1953, F. Schmid (G).
Figure Reference: Ali in Candolla.
Distrubution: Endemic to Baluchistan.
Flowering Period: June.
99. **Astragalus (Proselius) brahuicus** *Bunge*, Astrag. 1: 119.1868; 2: 205.1869.
Description: Bunge, Astrag. 2: 205.1869. This description should be supplemented by the description of the mature fruits as given below:

Legume 2.7—3.7 cm. long (including the beak at the tip), ±.3—.4 cm. broad, semicircular, the tip ending into a beak; uniformly pilose, hairs white, bilocular, septa almost complete; dehiscing by both the sutures. *Seeds* 14—16 per fruit; each seed ±.2—.3 cm. long, ±.2 cm. broad, roughly rectangular, glabrous, wrinkled, chestnut brown in colour.
Holotype: Baluchistan, Nichara, Stocks 1170 (K).
Synonymy: Nil.
Figure Reference: Nil.
Representative Specimens:
Baluchistan: Ziarat, Harsukh 20523 (K); Loralai, Bori valley, Lace 3685 (E).
Distribution: Endemic to Baluchistn.
Flowering Period: April-May.
100. **Astragalus (Proselius) sykesiae** *N. D. Simpson* in Kew Bull. 1913: 40.1913; Ali in Kew Bull. 1958 (2): 316.1958.
Description: Simpson in Kew Bull. 1913: 40.1913.
Holotype: Khorasan, Sykes 112, Herb. Sykes (Untraceable).

In Kew Herbarium there is a pencil drawing of the holotype made by M. Smith and the diagram of the floral parts by N. D. Simpson along with one dissected flower. The type was returned to Mrs. Sykes. It has not been possible to trace the whereabouts of Mrs. Sykes' Herbarium.

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan: Narai Kotal, 9,000′, Lace 3728 (E); Zarghun, 8,000′, 1.5.1888, Lace (E); Pil Hill, 7,000′, 14-5-1889, Lace 3685 (E).

Distribution: Persia, Khorasan; *W. Pakistan,* Balcuhistan.

Flowering Period: April-May.

101. **Astragalus (Xiphipidium) xanthoxiphidiopsis** *Rechinger f.* in Biol. Skr. Dan. Vid. Selsk. 9 (3): 169.1957.

Holotype: Sarobi, Steinige Steppe, gelbblühend, 12-5-1951, fl., fr., Volk 1871, 2569 (W).

Synonymy: Nil.

Figure Reference: Rechinger f. in Biol. Skr. Dan. Vid. Selsk. 9 (3): t. 202 and 203.1957.

Representative Specimens:

N.W.F. Province: Chitral, Turikho river, Istar, 10,000′, on stony slopes, height to 1 ft., straggling, corolla pale mauve,21-5-1958, J. D. A. Stainton 2488 (BM); Chitral, Shoghot, 36°. 1′N, 71°.45′E, 9,500′, pale purplish violet, steep stony slope facing west, 30-5-1958, S. A. Bowes Lyon 744 (BM).

Distribution: W. Pakistan, Chitral; *Afghanistan.*

Flowering Period: June.

102. **Astragalus (Xiphidium) subuliformis** *DC.* Astrag.: 134.1802; Ali in Kew Bull. 1958 (2): 316.1958.

Description: The description of *A. subulatus* as given by Baker in Hook. f. Fl. Brit. Ind. 2: 136.1876.

Holotype: 'In mountainous places around Black Sea, V. gr. Odessae and in various places in new Russia, in mountain vallies of Tauria specially at Soldajam (Sudac)', Pallas (not seen).

This specimen is untraceable at British Museum (Natural History) which possesses much of Pallas Herbarium. Under these circumstances 'Pallas, Astrag.: t. 20.1800′ based on Crimean material may be taken as the type.

Synonymy:

1. *Astragalus subulatus* Pallas, Astrag.: 22.1800, non Desf. (1799).
2. *A. anfractuosus* Bunge, Astrag. 1: 125.1868; 2: 218.1869.
3. *Philammos subulatus* (Pallas) Stev. in Bull. Soc. Nat. Moscou, 29: 146, 1856.

Figure reference: Pallas, Astrag.: t. 20., 20D, 1800.

Representative Specimens:

Baluchistan: Sorrange, 7,000′, Crookshank 3412 (K): Naru Karez, 5,000′, Lace 3706 (K). (E). Quetta, Duthie, 8634 (K).

N.W.F. Province: Kurram Valley, Parachanar, Harsukh 14755 (K)′.

Kashmir: W. of Leh, 12,000′, 1852, Thomson (K). Tibet Occ. 12,000′, Thomson (Type of *A. anfractuosus* Bunge (K). Paskyum, Baltistan, 9,500′, Osmaston 124 (K). Dras Valley, below Matiyan, 10—11,000′, Baltistan, Duthie, 11712 (BM).′ (E). Ladakh, Kargil, Treaty Road, Ludlow and Sherriff 8356 (BM).

Distribution: W. Pakistan: Baluchistan, N. W. F. Province; *Kashmir*; *Afghanistan*; *Russia*; Bessarabia, Middle Dnieper, Volga-Don, Lower Don, Lower Volga, Trans Volga, Crimea, Caucasia, Upper Tobol (Gontscharov and Popov, 1946).

Flowering period: July.

103. **Astragalus (Xiphidium) suffalcatus** *Bunge*, Astrag. I. 125. 1868; 2: 219; 1869.

Description: Boissier, Fl. Or. 2: 483.1872.

Lectotype: Kuchlak, Griffith 1566 (K).

Synonymy: Nil.

Figure Reference: Nil.

Representative Specimens:

Baluchistan plains, Stocks 905(K); (G);Enviorens de Quetta,30.4—1-5-1954. F. Schmidt 1558 (G).

Distribution: W. Pakistan, Baluchistan; *Afghanistan.*

Flowering Period: April-May.

104. **Astragalus (Buceras) hamosus** *Linn.* Sp. Pl.: 758.1753.

Description: Baker in Hook. f. Fl. Brit. Ind. 2: 122.1876.

Holotype: Messina and Mouspila. No. 926.19. (LINN).

Synonymy:

1. *Astragalus brachyceras* Ledeb. Cat. Hort. Dorpat: 3.1822.
2. *Ankylotus hamosus* (Linn.) Stev. in Bull. Soc. Nat. Moscou 29 (2): 148.1865.

Figure Reference: Nil.

Representative Specimens:

Punjab: Punjab, 1,000′, Thomson (K); (E); (G); Lahore, April, 1846, Thomson (K).

Distribution: W. Pakistan, Punjab; *Persia*; *Iraq*; *Jordan*; *Israel*; *Arabia*; *Kuwait*; *Egypt*; *Algeria*; *Morocco*; *Libia* (Pampanini, 1914) *Canary Islands*; *Portugal*; *Spain*; *France*; *Italy*; *Yugoslavia*; (Hayek, 1931); *Albania, Greece,*

Bulgaria; *Turkey*; (Gontscharov and Popov, 1946); Roumania (Prodan, 1923); *Russia*, Lower Volga, Crimea, Ciscauasia; Dagestan, East Transcauscasia, Talysh, Mountain Turkmenia (Gonscharov and Popov, 1946).
Flowering period: February-March.
Chromosome Number: $n=24$ (Tschechow, 1935).

105. **Astragalus (Xiphidium) imitensis** *Ali* in Candollea 17: 90. t. 14, 17.1960.

Description: Perennial herb, 30—40 cm. high. *Root* woody. *Stem* cylindrical, uniformly pilose, hairs appressed, white. *Leaf* ±3—5.5 cm. (excluding the terminal leaflet). Stipule lateral, free, subulate, ±.2 cm. long. Petiole 7—15 cm. long. Leaflets 9—11, petiolulate, petiolule < .1 cm.; lamina ovate to elliptical, margin entire, tip acute to mucronate, uniformly pilose on both the sides, ±.5—1.0 cm. long, ±.2—.4 cm. broad. *Inflorescence* raceme, ±10—31 cm. (in fruits) long; peduncle ±5—11 cm. long. *Flower* braceatet, bract ±.1—.2 cm. long; pedicel ±.1 cm. long. *Calyx* ±.7 cm. long, uniformly pilose, hairs white, teeth linear, ±.15—.2 cm. long. *Corolla* yellow (in dry condition). Vexillum 1.2—1.3 cm. long, ±.6 cm. broad, rhomboid, retuse at the tip. Wing ±1.1 cm. long, ±.15—.2 cm. broad, claw .5—.6 cm. long, auricle ± < .1 cm. long, blade bifurcated at the tip. Keel ±.8 cm. long, ±.2 cm. broad, claw ±.5 cm. long. *Stamens* diadelphous, 9+1, filaments .7—.9 cm. long. *Ovary* sessile, ±.4 cm. long, ±.1 cm. broad, uniformly pilose, hairs white, style ±.5 cm. long, glabrous, slightly curved at the tip. Stigma capitate. *Fruit* sessile, ±1.7 cm. long, ±.2 cm. broad, uniformly pilose, hairs white: fruit completely bilocular, ±.8 seeded. Seeds glabrous; mature seeds not seen.
Holotype: Kashmir, Imit, 2,900 m., 2—3-8-1954, F. Schmid 2072 (G).
Synonymy: Nil.
Figure Reference: Ali in Candollea.
Distribution: Kashmir.
Flowering Period: August.

106. **Astragalus (Xiphidium) fatmensis** *Hochst.* ex *Blatter*, Fl. Arab. II in Rec. Bot. Surv. Ind. 8 (2): 156.1921.

Baker, in Flora of British India, has adopted *Astragalus prolixus* Sieb. ex Bunge and regards *A. arabicus* Ehrenb. ex Bunge as synonym. In most of the other works on the plants of India and Pakistan (Cooke, 1902; Sabnis, 1923; Kashyap, 1936) *A. prolixus* Sieb ex Bunge has been adopted. Bunge (1868, 1869) Boissier (1872) and Baker f. (1929) have maintained *A. Prolixus* Sieb. ex Bunge and *A. arabicus* Ehrenb. ex Bunge as separate species. Hutchinson and Dalziel (1928), Andrews (1952) and Tacholm (1956) have maintained *Astragalus volelii* (Webb) Bornm. as the correct name of *A. prolixus* Sieb. ex Bunge, based on *Phaca vogelii* Webb. Blatter (1921) and Tackholm (1956) have adopted *A. fatmensis* Hochst ex Blatter (1921) for *A. arabicus* Ehrenb. ex Bunge (1868),

a name which happens to be a later homonym of *A. arabicus* Kotschy (1866). Schweinfurth (1896) has described var. *congestus* Schweinf. of *A. Arabicus* Ehrenb. ex Bunge, recently transferred to *A. vogelii* (Webb) Bornm. by Cufodontis (1955). Cufondontis however, regards *A. vogelii* (Webb.) Bornm., *A. arabicus* Ehrenb. ex Bunge and *A. prolixus* Sieb. ex Bunge to be conspecific.

Thus in this complex the confusion is taxonomic as well as nomenclatural. The number of taxa involved is not clear. From nomenclatural point of view 5 names are involved which require investigation.

This complex has been dealt with in two parts. (1) *Taxonomy of the group.* In this part all the characters employed by previous workers to differentiate taxa have been considered in detail; and (*ii*) *Nomenclature of the taxa* recognised following the taxonomic investigation.

(*i*) *Taxonomy of the group.*

Bunge (1868) has differentiated *A. arabicus* Ehrenb. ex Bunge and *A. prolixus* Sieb. ex Bunge on the basis of (*a*) pubescence of leaflets (*b*) colour of hairs on the calyx (*c*) ratio of the calyx and the corolla and (*d*) the number of ovules per ovary. Baker f. (1929) has also used as characters to distinguish the above taxa the colour of hairs on the calyx and the ratio of the length of the calyx and the corolla.

Schweinfurth (1896) has used the form of infructescence along with other characters to distinguish var. *congestus* Schw. of *A. arabicus* Ehrenb. ex Bunge. This character has also been used by Tackholm (1956) to separate the two taxa involved here. A critical study of these characters was made in 61 herbarium specimens, available at the herbaria of Royal Botanical Gardens, Kew; British Museum (Natural History); Museum National d'Histoire Naturelle, Laboratoire de Phanerogamie, Paris; Conservatoire et Jardin botanique, Geneva and Royal Botanical Gardens, Edinburgh. (For a list of these specimens one may refer to Ali, 1958c).

(*a*) *Pubescence of leaflets:*

The pubescence of the leaflets is quite variable. The upper surface of the leaflets may be subglabrous to uniformly pilose, but all the stages between the two extremes are met with. There is considerable variation even in the same specimen [e.g. Sind, Stocks x/x (K); Arabia, 16 miles east of Jedda, A. C. Prott 1540 (K); Ridge 4 miles n. of Jedda, A. C. Prott 1539 (K); Egypt, Island south of Assonon town, 14-11-'16. Comm. Walsingham (K)]; and the overlapping is so much that it was not possible to grade it satisfactorily. Therefore no reliance could be placed on this character.

(*b*) *The colour of the hairs on the calyx:*

Appreciable variation is met with in this character. The specimens having balck hairs on the flowering calyx, may have no black hairs on the fruiting

calyx. Sometimes the same specimen may have some calyces with and the others without black hairs [e.g. 16 miles south of Jedda, A. C. Prott 1540 (K); Egypt, Island south of Assonon town, 14-11-1916, F. G. Walsington (K) Dangola, 1820—1826, Ehrenberg (K)]; In view of the extreme variation of this character even in the same plant, it is not possible to use this character for taxonomic discrimination. Hence this character has not been considered further.

(*c*) *The nature of the inflorescence or infructescence:*

Two types of inflorescences may be noticed, *i.e.* (*i*) lax and (*ii*) compact inflorescence forming a head (Fig. 7). The two types are quite distinct from each other and may be distinguished without any confusion. Out of 61 herbarium specimens 19 specimens have a compact inflorescence while in 42 specimens the inflorescence is lax.

(*d*) *Ratio of the calyx and the corolla:*

In order to measure the length of the calyx and the corolla, only one flower per specimen could be taken into account. The length of the vexillum has been taken to be the basis of the length of the corolla. The frequency distribution curves (Fig. 8) of the length of the calyx and the vexillum are unimodal and quite uniform. The ratio between the lengths of the calyx and the vexillum was calculated in each case and designed by a symbol R (R=length of the vexillum/length of the calyx). The frequency distribution curve of 'R' (Fig. 9A) is trimodal, but quite continuous. Therefore any taxonomic segregation only on the basis of this character is not possible. How far this character can be used in conjunction with other characters will be discussed later. It is quite possible to obtain such peaks due to sampling error.

(*e*) *Length of the fruit:*

Bunge (1868) has considered the number of ovules per ovary to be significant in separating the two taxa. In *A. arabicus* Ehrenb. ex Bunge according to him, the ovary is six ovulate, whereas in *A. prolixus* Sieb. ex Bunge 4—5 ovules are described. It is not easy to count the number of ovules per ovary in each herbarium specimen, nor even the number of seeds per fruit, since this also involves breaking it open and this could not be done in every specimen. It was therefore decided to take into account the length of the fruit, which is directly proportional to the number of seeds it contains.

From each specimen, the length of the shortest and the longest fruit was measured and the mean of the two values was taken. The difference between the two values was never more than 3 mms. The frequency distribution curve of the mean range of the length of the fruit per plant (Fig. 9B) is quite uniform and unimodal.

(f) Correlation between different characters:

In order to study the correlation between different characters, the methed adopted is as follows: Each character has been represented by a symbol. Each symbol has been further graded to represent the variation of the character concerned. Thus the following three characters have been represented as follows:

(*i*) α =*the nature of the inflorescence or infructescence.*
α_1=Inflorescence compact (Fig. 7B)
α_2=Inflorescence lax (Fig. 7A)

(*ii*) β =*the ratio between the length of the vexillum and the calyx.*
β_1= .8—1.0
β_2=1.0—1.2
β_3=1.2—1.4
β_4=1.4—1.6

(*iii*) γ =*the mid-range of the length of the fruit.*
γ_1= .4— .6 cm.
γ_2= .6— .8 cm.
γ_3= .8—1.0 cm.
γ_4=1.0—1.2 cm.

(*i*) *Correlation betweeneach two characters* takenat a timehas been represented in Tables1—4. In each case the expected valueof each combination assuming the characters to vary independently of each other, has been shown in parenthesis. The value of X^2 has been calculated in each case to find out the probabilities of obtaining these values by chance. In Tables 3 and 4 which represent the correlation between α and γ and β and γ, the probability of obtaining these values by chance is $>.05$. This suggests that Y varies at randcm within this complex and does not show any significant correlation with either α or β. Hence the character Y has not been considered further.

The correlation between α and β has been shown in Table 1. The probability of obtaining these values due to chance lies between .05 and .02. But a marked difference from expectation is found if the data is regrouped in terms of α_1 and α_2 and β_1 and β_2 (Table 2). The probability of obtaining the values represented in Table 2 lies between .01 and .001, therefore it is established that there exists some form of correlation between α and β.

The correlation between the geographical distribution and the variation of these characters has been represented in Table 5. It is to be noted that the variation of α is directly correlated with the geographical distribution. In W. Tropical Africa, N. Africa, Sudan and Egypt only α_2 is present, while in W. Pakistan and India only α_1 is met with. The region of Arabia, Eritrea and Ethiopia form the regions of overlap. Table 6 shows the correlation between different combinations of α and β and the geographical distribution.

It will be seen from Table 1 that β is less variable when in combination with α_1 than with α_2. In case of α_1, out of 19 specimens 5.2% (1/19) have a value of β more than β_2, whereas in the case of α_2, out of 42 specimens, 33% (14/42) have a value of more than β_2 (i.e. 12 $\alpha_2\beta_3$ and 2 $\alpha_2\beta_4$).

In view of the facts discussed above it is possible to break the *A. prolixus* complex into two groups. For this purpose α will have to be used as the main character and β as a subsidiary character. The two taxa may be recognised as follows:

Inflorescence compact; the ratio of the lengths of vexillum and the calyx .8—1.2, rarely exceeding 1.2 ... Taxon A.

Inflorescence lax; the ratio of the lengths of the vexillum and the calyx usually .8—1.2, but not infrequently exceeding 1.2 ... Taxon B.

(*ii*) *Nomenclature of taxa A and B.*

The correct name of the taxon B is *Astragalus vogelii.* (Webb) Bornm. This combination is based on *Phaca vogelii.* Index Kewensis refers to "Phaca vogelii Webb. in Hooker Niger Fl. 123. t. 8.1849". However Hooker also published it in "Icon. Plant. 8: t. 763.1848". The plate 8 of Niger Flora is exactly the same as t. 763 of Icones Plantarum and both the works give cross reference to the other. The description produced in Hooker's Icones Plantarum is exactly the same as given by Webb (1849). Therefore it is clear that Hooker had an access to the manuscript of Webb and the species must be attributed to Webb. However, the description and the plate of *Phaca vogelii* was published first in Icones Plantarum in 1848, hence the correct citation will be "Phaca vogelii Webb in Hook. Ic. Pl.: t. 763.1949."

Synonymy:

1. *Astragalus prolixus* Sieb. ex Bunge, Astrag. 1: 9.1868; 2: 6.1869.

The correct name of taxon 'A' appears to be *Astragalus fatmensis* Hochst. ex Blatter.

Description: The description of *Astragalus prolixus* as given by Cooke, Fl. Bomb. Pres. 1: 329.1902.

Lectotype: Punjab, Edgeworth (K).

Blatter (1921) was the first to have adopted *Astragalus fatmensis* as a *nomen novum* for *A. arabicus* Ehrenberg ex Bunge which is a latter homonym of *A. arabicus* Kotschy (1866). Therefore the lectotype of *A. fatmensis* Hochst. ex Blatter will be a specimen selected out of specimens cited by Bunge along with the original description of *A. arabicus* Ehrenb. ex Bunge. Bunge has cited 4 specimens out of which one was observed by him at Kew Herbarium. I have selected this specimen (Punjab, Edgeworth) as the lectotype. I have refrained from selecting 'Schimper 843' because under this name apparently more than

one taxon have been distributed. This is also borne out by the fact that Bunge himself cites it for *A. gyzensis* Delile also.

Synonymy:

1. *Astragalus arabicus* Ehrenb. Bunge, Astrag. 1: 9.1868; 2: 6.1869. non Kotschy (1866).

2. *A. prolixus* auct. non. Sieb. ex Bunge: Baker in Hook. f. Fl. Brit. Ind. 2: 121.1876.

3. *A. arabicus* Ehrenb. ex Bunge var. *congestus* Schweinf. in Bull. Herb. Boiss. 1896, app. 2: 248.1896.

4. *A. vogelii* (Webb) Bornm. var. *congestus* (Scheinf.) Cuf. in Bull. Jard. Bot. Etat Brux. 25. suppl.: 290.1955.

Figure Reference: Nil.

Representative Specimens:

Punjab: Ludhiana, Drummond 4417 (K); 4415 (K); 4404 (K); 4412A(K); 4410A (K); 4421 (K); 4420 (K); 4418 (K); 4408 (K); 4411A (K), 4407 (K); Sandal Bar, Edgeworth 2020 (K).

Punjab, Thomson (K). Lahore, Brandis 2916 (K). Ludhiana, Edgeworth 67 (K).

Sind: Stocks (K).

Baluchistan: Kohi Shimsh, Coast of Baluchistan, E. Pierce (K). N. W. India, J. L. Stewart (E).

Distribution: W. Pakistan, Punjab, Sind, Baluchistan.

India, Punjab; *Arabia: Eritrea: Ethiopia.*

Flowering Period: February-March.

Excluded Species:

1. *Astragalus hyrcanus* Pallas.

Lace and Hemsley (1891) have reported this species from Baluchistan. Burkill (1909) has pointed out that probably *A. hyrcanus* Pallas does not occur in Baluchistan and this record is based on misidentification of *A. squarrosus* Bunge. I have observed the Lace's specimens labelled as *A. hyrcanus* [Lace 3570 (K): (E)] which actually belongs to *A. squarrosus* Bunge.

Parsa (1948) also reported *A. hyrcanus* from Baluchistan. He has followed Boissier (1872) in the circumscription of this species. It is to be noted that *A. hyrcanus* sensu Boiss. is different from *A. hyrcanus* Pallas (Gontscarov and Borissova, 1946). Popov (1947) regards *A. hyrcanus* sensu Boiss as a synonym of *A. igniarius* Popov. I have not seen any specimen from Baluchistan which could be attributed to this taxon.

2. *Astragalus bludhistanus* Bunge, Astrag. 1: 76.1868; 2: 129.1869.

This species is typified by 'Stocks 17, K'. In Kew Herbarium there is a specimen labelled as Stocks 17; however, there are certain differences between

the description given by Bunge and the specimen under consideration i.e. (*i*) Bunge describes the leaflets as 'trijugis': in this specimen the leaves have more than three pairs of leaflets (up to 6 pairs), (*ii*) Bunge has given the measurements of leaflets as '2' ' longa, superne '1½' ' lata: in this specimen the leaflets are generally bigger 1 cm. long, ±.3 cm. broad), (*iii*) Bunge has also described the floral parts and fruits; the present specimen lacks any fruits and has only one young flower.

Thus it is clear that this specimen is not the type. It agrees with *A. russelii* Solanad, a taxon which does not occur in Baluchistan. Boissier (1872) has referred 'Stocks 972' as *A. bludhistanus* Bunge, but 'Stocks 972' is *A. anisacanthus* Boiss. I have not seen any specimen which could be accepted as *A. bludhistanus* Bunge (according to description), therefore, presently I have excluded this species.

3. *Astragalus* (*Aegacantha*) *decemjugus* Bunge, Astrag. 1: 43.1868; 2: 67.1869.

Boissier (1849) based *A. psilacanthus* on 'Griffith 1050 and 1051 in Hooker Herbarium'. Bunge (1868, 1869) pointed out that 'Griffith 1051' is different from 'Griffith 1050'. He retained *A. psilacanthus* Boiss. for Griffith 1051 which he characterised by its leaves having c. 6 pairs of ovate very acute leaflets. He included Griffith 1050 in a new species, *A. decemjugus* Bunge, which he distinguished from *A. psilacanthus* Boiss. by its leaves having 10—13 pairs of leaflets which are oblong obtuse and by its elongated peduncles, much longer than the flowers. In Kew Herbarium there is a Griffith's specimen numbered 1051 from Hooker's Herbarium (cut from a sheet the rest of which is missing) having 5—9 pairs of leaflets and peduncles shorter than the flowers. This can be accepted as the type of *A. psilacanthus* Boiss.

Griffith 1050 from Hooker's Herbarium, the type of *A. decemjugus* Bunge is missing. Another specimen, Griffith 1538 cited by Bunge under *A. decemjugus* Bunge is also not traceable at Kew. As yet no such specimens have been found which agree with the description of *A. decemjugus* Bunge, therefore the correct identity of this taxon could not be determined.

It has not been possible to obtain any material of the following species: (Nos. 4—5):

4. *A. harsukhianus* Rech. f. in Biol. Skr. Dan. Vid. Selsk. 9 (3): 142.1957.

5. *A. mangeri* Bornm. in Bot. Jahrb. 66: 225.1934.

The account of the genus *Astragalus* formed part of the thesis approved for the degree of Ph. D. by the University of London, 1958. Since then some more taxa have come to light which have also been incorporated here.

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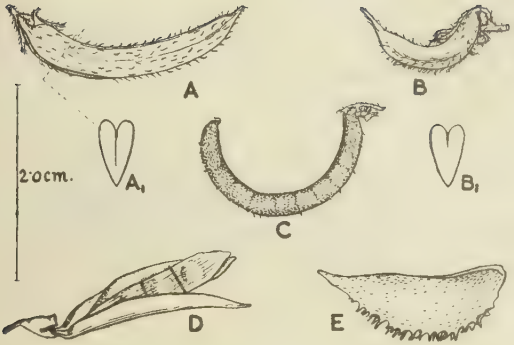


Fig. 1.—A. surface view of pod; A_1. T.S. pod, *Astragalus eremophilus* [Stocks 716 (K)]; B. surface view of pod; B_1. T.S. pod, *A. amherstianus* [Banabal, 6,000, Thomson (K)]; C. pod, *A. bakaliensis* [Lace 3576 (E)]; D. pod, *A. hosackioides* [Kumaun, Thomson 586 (K)]; D. pod, *A. compositus* [Swat, Lahore students with Prof. Salim 86 (RAW)].

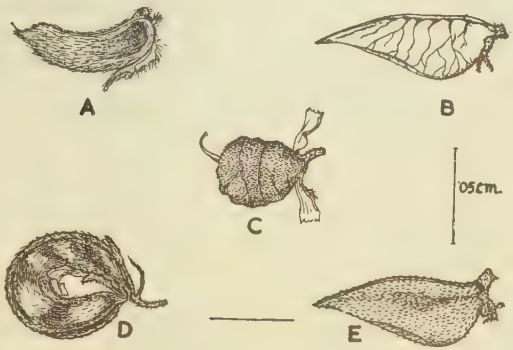


Fig. 2.—Fruits of *Astragalus*. A. *A. tribuloides* [Zeedu, Stocks 807 (K)]; B. *A. ammophilus* var. *ammophilus* [Kar. and Kir. 1386 (K)]; C. *A. densiflorus* [Sapar, 1852, Thomson (K)]; D. *A. contortuplicatus* [Stocks 406 (K)]; E. *A. ammophilus* var. *persipolitanus* [Stocks 1085] (K).

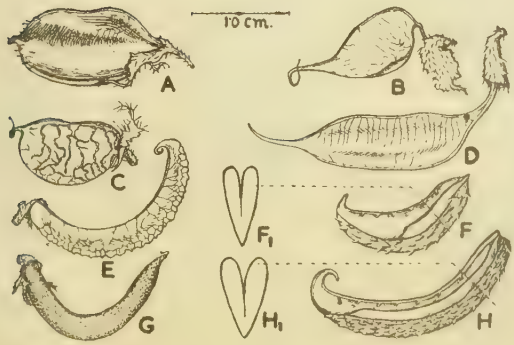


Fig. 3.—Fruits of *Astragalus*. A. *A. melacophyllus* [Falconer 422 (K)]; B. *A. stewartii* [Duthie 2811 (K)]; C. *A. retamocarpus* [Swat, Lahore students 101 (RAW)]; D. *A. bakeri* [Kashmir, Falconer (K)]; E. *A. corrugatus* [Stocks 752 (K)]; F. surface view F_1. T.S. *A. gracilipes* [W. of Leh, Indus Valley, 11,000, Zanskar, 12,000, 1852, Thomson (K)]; G. *A. hamosus* [Lahore, April, 1852, Thomson (K)]; H. surface view, H_1. T.S. *A. affghanus* [Stocks 716 (K)].

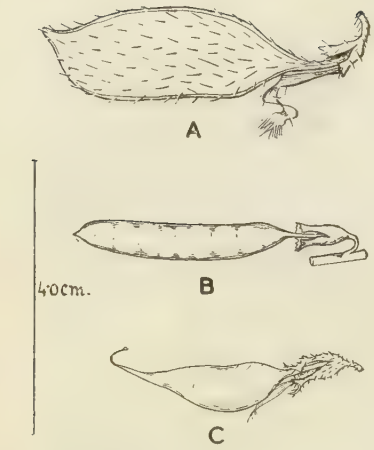


Fig. 4.—Fruits of *Astragalus*. A. *A. auganus* [Stocks 939 (K)]; B. *A. graveoleus* [Garhwal, Dhauli River 9,000, Strachey and Winterbottom 3 (K)]; C. *A. concretus* [Clarke 29292 B (K)].

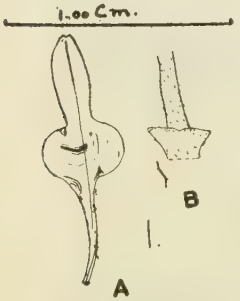


Fig. 5.—A. appediculate vexillum, *A. gracilipes* [Tibet occ., Thomson (K)]; B. stalk of *A. hemsleyi* [Aitchison 1215 (K)].

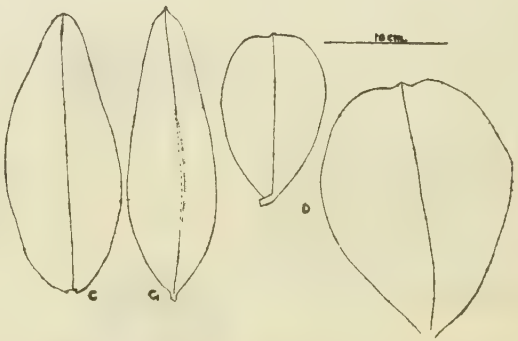


Fig. 6.—C, C_1. leaflets of *A. tephrosoides* var *tephrosoides* [C, Griffith 1038 (K), C_1, Griffith 1063 (K)]; D. leaflets *A. tephrosoides* var *lacei* [Lace 3863 (E)].

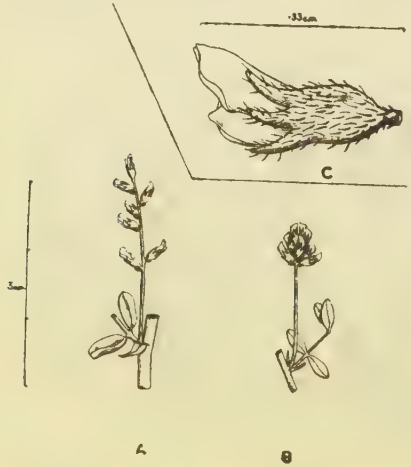


Fig. 7.—A. inflorescence, *A. vogellii* [Central Sahari, Chiff 93 (K)]; B. inflorescence, C, flower, *A. fatmensis* [Lahore, Braudis 2916 (K)].

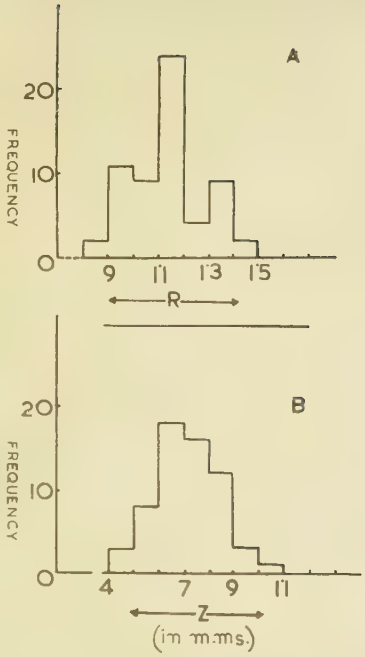
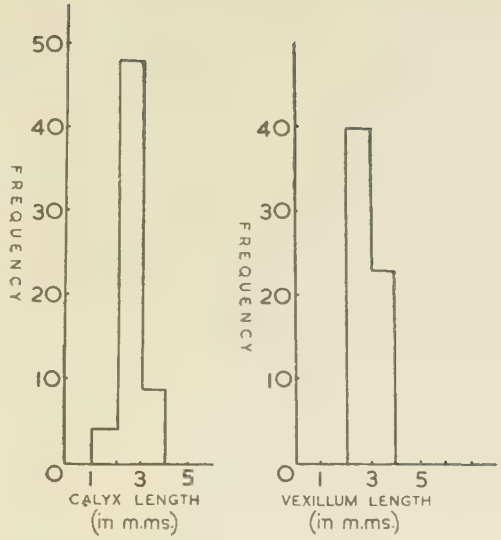


Fig. 9.—R = Length of vexillum/length of calyx ; Z = Mean range of the length of fruit per plant.



Fig, 8

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A. oplites, 68
A. orbiculatus, 47
A. orthocarpus, 34
A. oxyodon, 39
A. pedunculares, 75
A. pindreensis, 59
A. polybotrys, 54
A. polycanthus, 68
A. pseudo-psilacanthus, 67
A. psilacanthus, 67
A. psilocentros var. *pilosus*, 63
A. psilocentros var. *psilocentros*, 62
A. ptilocephalus, 17
A. purpurascens, 61
A. pycnorhizus, 10
A. pyrrhotrichus, 53
A. retamocarpus, 54
A. rhizanthus, 57
A. rhizocephalus, 51
A. scorpiurus, 16
A. sericostachys, 20
A. squarrosus var. *sangonensis*, 73
A. squarrosus var. *squarrosus*, 72
A. staintonianus, 57
A. stewartii, 35
A. stocksii, 72
A. strictus, 41
A. strobiliferus, 18
A. subuliformis, 77
A. subumbellatus 17
A. suffalcatus, 78
A. sykesiae, 76
A. tenuicaulis, 41
A. tephrosoides var. *lacei*, 34
A. tibetanus, 43
A. toppinianus, 49
A. tribulifolius, 10
A. tribuloides, 24
A. trichocarpus, 71
A. webbianus, 55
A. xanthoxiphidiopsis, 77
A. zanskarensis, 58
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TABLE 1

	β_1	β_2	β_3	β_4
α_1	9	9	1	0
	(4.67)	(9.65)	(4.05)	(.63)
α_2	6	22	12	2
	(10.33)	(21.35)	(8.95)	(1.37)

$x^2=9.463$
Degrees of Freedom=3
$.05>P>.02$

TABLE 2

	β_1	$\bar{\beta}_1$
α_1	9	10
	(4.7)	(14.3)
α_2	6	36
	(10.3)	(31.7)

$x^2=6.665$
Degrees of Freedom=1
$.01>P>.001$

TABLE 3

	y_1	y_2	y_3	y_4
α_1	2	10	6	1
	(2.6)	(10.6)	(5.3)	(0.3)
α_2	7	24	11	0
	(6.4)	(23.4)	(11.7)	(.7)

$x^2=4.6554$
Degrees of Freedom=3
$P=>.05$

TABLE 4

	y_1	y_2	y_3	y_4
β_1	0	6	8	1
	(2.2)	(8.1)	(4.4)	(.4)
β_2	6	20	5	0
	(4.67)	(16.8)	(9.1)	(.6)
β_3	2	6	5	0
	(1.9)	(7.0)	(3.8)	(.2)
β_4	1	1	0	0
	(.3)	(1.08)	(.6)	(.033)

$x^2=15.1043$

TABLE 5

Characters	West Tropical Africa	North Africa	Sudan	Egypt	Eritrea and Ethiopia	Arabia	West Pakistan and India	Total
α = Nature of influence								
Compact (α_1) ...	...	...	...	...	4	4	11	19
lax (α_2) ...	4	6	6	16	1	9	...	42
Total ...	4	6	6	16	5	13	11	61
β = Length of the vexillum/ Length of the calyx								
.8— .9 (β_1) ...	...	1	...	...	4	5	3	13
1.0—1.2 (β_2) ...	3	3	4	9	1	6	7	33
1.2—1.4 (β_3) ...	1	2	...	7	...	2	1	13
1.4—1.5 (β_4) ...	...	...	2	...	...	...	...	2
Total ...	4	6	6	16	5	13	11	61

TABLE 6

Specimens	West Tropical Africa	North Africa	Sudan	Egypt	Eritrea and Ethiopia	Arabia	West Pakistan and India	Total
$\alpha_1\beta_1$ ...	...	...	...	...	4	2	3	9
$\alpha_1\beta_2$ ...	...	...	...	...	...	2	7	9
$\alpha_1\beta_3$ ...	...	...	...	...	...	...	1	1
$\alpha_1\beta_4$ ...	...	...	...	...	...	...	...	...
$\alpha_2\beta_1$ ...	...	2	...	...	...	4	...	6
$\alpha_2\beta_2$ ...	3	2	4	9	1	3	...	22
$\alpha_2\beta_3$ ...	1	2	...	7	...	2	...	12
$\alpha_2\beta_4$ ...	...	...	2	...	...	...	...	2
Total ...	4	6	6	16	5	13	11	61